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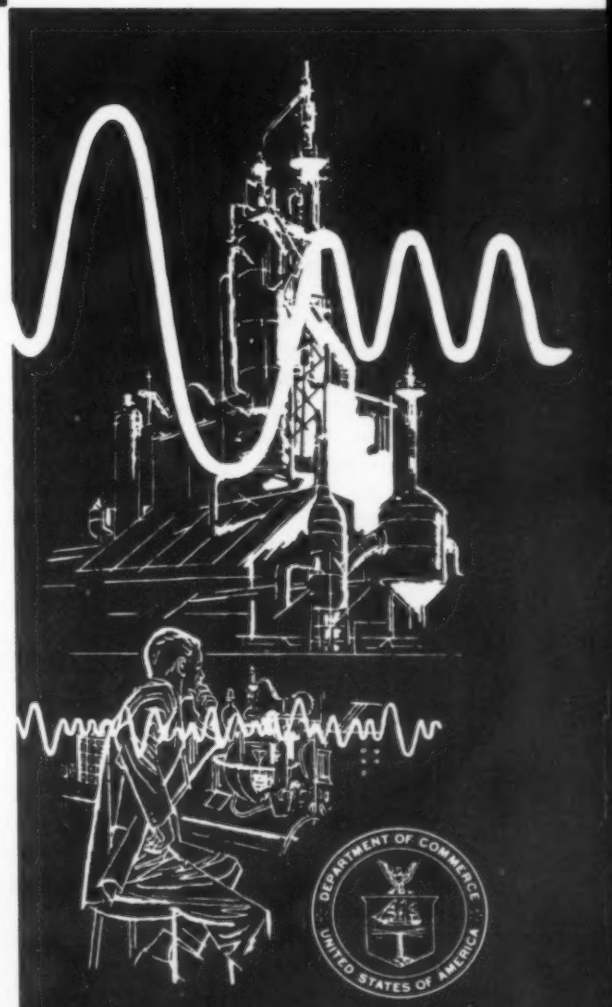

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Luther H. Hodges, *Secretary*

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THE INFLUENCES OF RELEASED LATENT HEAT OF VAPORIZATION ON CYCLONE DEVELOPMENT.
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AD-407 371 DIV. 7

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STATIC AND FATIGUE STRENGTH OF DISSIMILAR TI-8AL-4MO TI-3AL-2.5 SN ALLOY SPOTWELDS: TENSION-SHEAR: CROSS-TENSION: FAILURE TESTS.
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FATIGUE (MECHANICS)

STATIC AND FATIGUE STRENGTH OF DISSIMILAR TI-8AL-4MO TI-3AL-2.5 SN ALLOY SPOTWELDS: TENSION-SHEAR: CROSS-TENSION: FAILURE TESTS.
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WELDS

MACHINE SETTINGS FOR SEAM WELDING TITANIUM AND TITANIUM-6 ALUMINUM-4 VANADIUM ALLOY SHEETS AND SHEAR STRENGTH OF SEAM WELDS.
AD-407 588 DIV. 17

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***TRAINING DEVICES**

VISUAL DISPLAY REQUIREMENTS FOR THE PILOTS VISUAL TASK.
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EVALUATION AND IMPROVEMENT OF RADAR BEACON SYSTEMS: QUARTERLY PROGRESS REPT. NO. 3.
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CORROSION EFFECTS OF VARIOUS DE/CE DECONTAMINANTS ON COMMON METALS IN MANUFACTURE OF HIGH-SPEED AIRCRAFT.
AD-407 487 DIV. 3

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MACHINE SETTINGS FOR SEAM WELDING TITANIUM AND TITANIUM-6 ALUMINUM-4 VANADIUM ALLOY SHEETS AND SHEAR STRENGTH OF SEAM WELDS.
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AD-407 296 DIV. 9

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AD-407 266 DIV. 6

*WATER
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FEASIBILITY OF COMBINING AN ION EXCHANGE MEMBRANE ELECTROLYSIS CELL AND AN ION EXCHANGE MEMBRANE FUEL CELL. FUEL CELL METHOD OF RECOVERING POTABLE WATER FROM URINE. ELF SYSTEM.
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AD-407 200 DIV. 30

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DETERMINING ECONOMIC QUANTITIES OF MAINTENANCE RESOURCES: A MINUTEMAN APPLICATION.
AD-407 200 DIV. 30

*WEATHER STATIONS

RELATIONSHIP BETWEEN ATMOSPHERIC WATER BUDGET AND SATELLITE CLOUD OBSERVATIONS OVER GULF OF MEXICO: MASTER'S THESIS.
AD-407 453 DIV. 2

*WELDING
AUSTENITE

STUDY OF THE TRANSFORMATIONAL BEHAVIOR OF WELD HEAT-AFFECTED ZONE AUSTENITE UPON COOLING.
AD-407 363 DIV. 17

*WELDING
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AN ELECTRON BEAM WELDING GUN USED TO EFFECT A NON-MELTING, POST-HEAT TREATING PASS EMBRACING ONLY FUSION AND HIGH TEMPERATURE HEAT-AFFECTED ZONES. THE TECHNIQUE APPLIED TO FIVE 000 TITANIUM SHEET ROLLING ALLOYS, SEVERAL TYPES OF HIGH STRENGTH STEEL, MOLYBDENUM AND MOLYBDENUM--0.5 TITANIUM ALLOY, ALL IN 1/8 IN. THICKNESS.
AD-407 313 DIV. 26

*WELDS
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MACHINE SETTINGS FOR SEAM WELDING TITANIUM AND TITANIUM-6 ALUMINUM-4 VANADIUM ALLOY SHEETS AND SHEAR STRENGTH OF SEAM WELDS.
AD-407 588 DIV. 17

*WIND TUNNEL MODELS
INTERFERENCE

TEST SECTION FLOW BLOCKAGE CHARACTERISTICS AT MACH 6 IN A HIGH TEMPERATURE HYPERSONIC GASDYNAMICS FACILITY. CORRELATION OF WIND TUNNEL BLOCKAGE DATA: FINAL REPT.
AD-407 689 DIV. 9

*X-RAY DIFFRACTION ANALYSIS
MICROSCOPY

LARGE-AREA, CADMIUM SULFIDE, THIN FILM SOLAR CELL ARRAY INVESTIGATION: QUARTERLY TECHNICAL PROGRESS REPT. NO. 3.
AD-407 529 DIV. 7

*X-RAY DIFFRACTION ANALYSIS
SYMMETRY (CRYSTALLOGRAPHY)

ANALYTICALLY INDEXING THE SIMULTANEOUS DIFFRACTIONS IN (MONOCLINIC) ANTHRACENE.
AD-407 669 DIV. 25

*ZINC
CORROSION

CORROSION EFFECTS OF VARIOUS DE/CE DECONTAMINANTS ON COMMON METALS IN MANUFACTURE OF HIGH-SPEED AIRCRAFT.
AD-407 487 DIV. 3

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-407 011 Div. 1, 29
(TISTM/AM) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
T-33 AIRCRAFT SURVIVAL CONTAINER,
by Paul W. Barnett. Oct 61, 6p.
AAL TN61 8 Unclassified report

Descriptors: *Jet training planes, *Survival kits, Containers, Design, Feasibility studies, Sleeping bags.

AD-407 063 Div. 1, 27
(TISTA/GEC) OTS price $1.10

Frankford Arsenal, Philadelphia, Pa.
XM12 ROCKET CATAPULT FOR DOUGLAS RB66 AIRPLANE,
by A. Benditt. Jan 63, 12p.
DA Proj. 5S02 06 001
FA MR M63 21 1 Unclassified report

Descriptors: *Jet bombers, *Catapults, Tests, Cartridges (Pad), Acceptability, Ballistics, Ejection seats.

This report describes the testing of nine Frankford Arsenal XM12 rocket catapults with the Douglas Aircraft RB66 airplane. The results show that the performance of the XM12 catapult was satisfactory and that it will safely eject the designated seat-man system throughout the operational speeds and altitude range of the B-RB66 series aircraft. (Author)

AD-407 353 Div. 1
(TISTA/GEC) OTS price $3.60

National Aviation Facilities Experimental Center,
Atlantic City, N. J.
ACTIVITY REPORT.
Jan 62, 32p.
ESD TDR62 19 Unclassified report

Descriptors: *Glide path systems, *Landing aids, *Ground controlled approach radar, *Air traffic control systems, Runways, Communications systems, Data processing systems, Navigation, Aviation safety, All-weather aviation, Instrument landings, Scientific research.

AD-407 445 Div. 1
(TISTP/HSS) OTS price $2.25

Marlin-Rockwell Corp., Jamestown, N. Y.
DESIGN CRITERIA FOR ROLLING ELEMENT AIR FRAME BEARINGS FOR HIGH TEMPERATURE AND HIGH ALTITUDE USE.
Rept. for Jul 59-Jul 62,
by Harold E. Munson, Jamshed B. Havewala, and John H. Johnson. Apr 63, 85p. 1299
Contract AF33 616 6650, Proj. 1315, Task 131501
ASD TDR62 900
Unclassified report

Report on Bearings and Mountings for Advanced Systems.

Descriptors: *Airframe bearings, High altitude, Bearings, Aircraft, Configuration, Lubricants, Roller bearings, Friction, Ball bearings, High temperature research, Design.

Aircraft Control Bearings were experimentally studied to evaluate bearing design, materials, and lubricants for operation at 1200 F and 250,000 ft. altitude. Four roll design, twelve material combinations and five dry lubricants were investigated. The best design and two best material combinations (6B (Cobalt Alloy) vs 6B and CA-3 (Tungsten Carbide Cermet) vs 6B) were subjected to stresses up to 325,000 psi at the temperature and altitude. One in. diameter bore, self aligning, double row roller bearings fabricated from 6B vs 6B carried loads to 5000 lbs. for 40,000 cycles at 1200 F and 250,000 ft. altitude when lubricated with DF-700 dry film. Friction coefficients with the lubricants ranged from .08 to .25. Successful bearing operation requires considerable deviation from design criteria for fluid lubricated bearings. (Author)

AD-407 587 Div. 1, 17, 26
(TISTA/GEC) OTS price $1.60

General Dynamics, Convair, San Diego, Calif.
SPEED-BRAKE CASTING, 8-73673, EVALUATION OF,
by P. W. Bergstedt. 13 Mar 57, 16p. 56 216; 8926 159
Contract AF33 657 8926
Unclassified report

Report on Material - Magnesium - AZ91 Casting. Evaluation of Non-Destructive Inspection Procedures.

Descriptors: *Jet fighters, *Air brake flaps, Quality control, Magnesium alloys, Castings, Radiography, Dyes, Tensile properties, Nondestructive testing, Porosity, Acceptability.

The multi-ribbed framework for the F-102A airplane speed brake door is an AZ91 magnesium alloy casting about 2-1/2 feet wide by 4-1/2 feet long. This complex casting, which essentially is a lattice of thin-walled ribs, is heat treated and aged prior to end use. Since excessive porosity was encountered with a large number of castings, correlations of the casting strengths with the results of dye-penetrant and radiographic inspection were required. As a result of comparisons of tensile strength data with dye-penetrant and radiographic inspections, the following conclusions were drawn: (1) dye-penetrant inspection is inadequate for determining acceptable limits

of casting porosity; and (2) x-ray ratings correlated very well with tensile test results. Radiographic inspection thus was considered the more reliable inspection method. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-406 876 Div. 2
(TISTP/JEA) OTS price $1.60

Washington U., Seattle.
THE INVESTIGATION OF SOME TECHNIQUES FOR MEASUREMENT OF HUMIDITY AT HIGH ALTITUDES,
by Robert J. Charlson and K. J. K. Buettner.
Mar 63, 11p. Scientific rept. no. 1
Contract AF19 628 303, Proj. 6020, Task 602002
AFCRL 63 415 Unclassified report

Descriptors: *Humidity, *Hygrometers, Chromatographic analysis, Water vapor, Separation, Capacitors, Dielectric properties, High altitude, Calibration, Upper atmosphere, Meteorological instruments.

Two approaches to the problem of measuring humidity at high altitudes are described. The first consists of the adaptation of the principle of gas chromatography to the separation of minute amounts of water from air. The laboratory experiments and apparatus are described. A possible design for an automatic chromatographic hygrometer is presented. The second approach consists of the use of the chromatographic packing as the dielectric of a small capacitor. The results of experiments with this new technique are presented. This device is unique inasmuch as its response can be described by an acceptable theory. The results of a literature survey are summarized. (Author)

AD-407 124 Div. 2
(TISTP/RLG) OTS price $6.60

Air Photographic and Charting Service, Military Air Transport Service, Turner Air Force Base, Albany, Ga..
REPORT OF RESULTS - EASTERN PACIFIC SURVEY. VOL. II.
15 June 63, 1v.
Proj. AF61 2
Unclassified report

Descriptors: *Geological survey, *Photographic analysis, Data, Photographs, Aerial photography, Mapping, Geography, Terrain.

AD-407 164 Div. 2, 6
(TISTP/JEA) OTS price $6.60

Air Photographic and Charting Service, Military Air Transport Service, Palm Beach Air Force Base, Fla.
EASTERN PACIFIC SURVEY. VOLUME III.
Rept. of results.
15 June 63, 1v.
Proj. AF61 2 Unclassified report

Descriptors: *Radar stations, Geodesics, Aircraft, Navigation, Maps, Photographs, Air transportation, Radar tracking.

AD-407 165 Div. 2
(TISTP/FR) OTS price $7.60

Cornell U., Ithaca, N. Y.
SECULAR CHANGES IN THE SOLAR SYSTEM,
by Peter Goldreich. Feb 63, 74p. CRSR128
Grant 62 191
AFOSR 4743
Unclassified report

Descriptors: *Satellites (Artificial), Orbital trajectories, Planets, Tides.

Contents: On the Inclination of Satellite Orbits About an Oblate Precessing Planet; On the Eccentricity of Satellite Orbits in the Solar System; An Explanation of the Frequent Occurrence of Near-Commensurate Mean Motions in the Solar System; and Literature Cited.

AD-407 255 Div. 2, 30
(TISTP/MFA) OTS price $14.00

Civil Engineering Systems Lab., Mass. Inst. of Tech., Cambridge.
ANALYTICAL AERIAL TRIANGULATION ERROR ANALYSIS AND APPLICATION OF COMPENSATING EQUATIONS TO THE GENERAL BLOCK TRIANGULATION AND ADJUSTMENT PROGRAM. APPENDIX.
Final technical rept., Mar 60-Feb 62,
by Andrew R. Luis, Ziad M. Elias and Frank S. Greatorex. Feb 62, 1v. RR R62 4
Contract DA44 009ENG4420, Task 8T35 11 001 05
Unclassified report

Descriptors: *Photogrammetry, *Errors, *Mapping, *Programming (Computers), Geodesics, Least squares method, Equations, Aerial reconnaissance, Analysis, Position finding, Digital computers.

Improved accuracy in the supplied General Block Triangulation digital computer program is described through incorporation in the program means of error adjustment and compensation as follows: (1) the nature of random and systematic errors and the basic techniques for treating their effects as applicable to the analytical photogrammetric problem; (2) the basic least squares method and its incorporation in the computer program; (3) complete mathematical description of the program; (4) studies of the nature and effects of the important error sources: lens and camera errors, atmospheric refraction, film distortion; (5) the study of various techniques for the solution of simultaneous equations; (6) operating instructions; and (7) the results, conclusions, and resulting recommendations of test runs of the final computer program. (Author)

AD-407 335 Div. 2, 25
(TISTP/FR) OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
EXPERIMENT AND PRELIMINARY RESULTS OF SATELLITE DETERMINATIONS OF THE VERTICAL DISTRIBUTION OF OZONE AND OF THE ALBEDO IN THE NEAR ULTRAVIOLET,
by E. B. Mayfield, R. D. Rawcliffe, R. M. Friedman, and G. E. Meloy. 3 May 63, 40p.
TDR169 3260 50TN2
Contract AF04 695 169
SSD TDR63 103 Unclassified report

Descriptors: *Ozone, Atmosphere, Albedo (Astronomy), Ultraviolet radiation, Sun, Measurement, Satellites (Artificial), Spectrum analyzers, Radiometers, Ultraviolet filters.

A satellite experiment to determine both the vertical distribution of ozone above 70 km and the radiance of the atmosphere at the center of

the Hartley absorption band of ozone at 2550 Angstroms is described. Two flights of the experiment were made successfully, resulting in measurement of the vertical distribution between 60 and 85 km and of the radiance at the nadir for sun angles from 90 to about 49 degrees. The vertical distribution data agree with previous results below 70 km and with theory to 85 km. The radiance, which was not measured previously, is observed to have a maximum value of 2.0 times 10 to the 9th w/sq cm-sr-Angstroms for a solar zenith angle of 49 degrees. (Author)

AD-407 453 Div. 2
(TISTP/RLG) OTS price $5.60

Texas A and M Coll., College Station.
GULF OF MEXICO CLOUD OBSERVATIONS AND THE ATMOSPHERIC WATER BUDGET.
Master's thesis,
by Richard Wesley Banks. May 63, 51p.
Unclassified report

Descriptors: *Cloud cover, *Atmosphere, Weather stations, Upper atmosphere, Water vapor, Measurement, Clouds, Errors, Meteorological parameters, Distribution, Meteorological satellites, Humidity.

A study is made to determine if any detectable relationship existed between the atmospheric water budget and satellite cloud observations over a restricted area. Four consecutive days in July 1961 constituted the time period. Upper air data from nine weather stations, bordering the Gulf of Mexico, were used in the calculations of the water vapor budget. Computations were made of the water vapor storage, water vapor flux, and water vapor balance. The cloud observations were then related to diagrams and graphs of these computations. The large distances between weather stations reduced the value of the computations. The cloudy areas sometimes occurred between stations; therefore the measurements were not always representative of what was happening over the total area. The water vapor in the atmosphere had a stream-like structure as it flowed over the Gulf. Clouds were associated with this flow, particularly when it changed direction. (Author)

AD-407 457 Div. 2
(TISTP/AW) OTS price $3.60

Oregon State U., Corvallis.
PRODUCTION EFFICIENCY OF DIFFERENT SILVER IODIDE ICE-FORMING NUCLEI GENERATORS,
by Hilda Jane Snelling. June 63, 30p.
Unclassified report

Master's thesis.

Descriptors: *Gas-generating systems, *Ice, Silver compounds, Iodides, Effectiveness, Smokes, Artificial precipitation, Meteorological parameters, Meteorological instruments, Nucleation.

Tests compared the production efficiencies of the following three silver iodide ice-forming nuclei generators: one burning charcoal soaked in a 2% silver iodide acetone solution, one in which a jet of propane gas atomized a 2% silver iodide acetone solution, and one in which a jet of compressed air atomized this same solution. An optical pyrometer measured the generator operating temperatures. The United States Weather Bureau Bigg-Warner Type Ice Nuclei Counter provided counts of the number of effective ice nuclei produced by the generators at different temperatures. The tests occurred at these three temperatures of the ice nuclei counter, -12 C, -15 C, and -20 C. The number of active nuclei produced per second of operation and the number of active nuclei produced per gram of silver iodide used determined the efficiency of the generator. In all cases tested the acetone air generator had higher efficiency than either the charcoal generator or the propane generator. Both the acetone air generator and the propane generator had equal efficiency at the two operating temperatures tested. (Author)

AD-407 488 Div. 2
(TISTP/RLG) OTS price $5.60

Weather Forecasting Research Center, U. of Chicago, Ill.
ON THE INFLUENCE OF RELEASED LATENT HEAT ON CYCLONE DEVELOPMENT,
by Maurice B. Danard. June 63, 51p. Scientific rept. no. 10
Contract AF19 604 7230, Proj. 8641, Task 86410
AFCRL 63 623 Unclassified report

Descriptors: *Cyclones, *Heat, *Kinetic theory, Theory, Velocity, Adiabatic gas flow, Mechanics, Motion, Statics, Meteorology, Friction, Numerical analysis, Vortices, Vaporization, Wind.

The influences of release of latent heat of vaporization on vertical motion, production of kinetic energy, and development of low-level vorticity were investigated. The vertical motion was obtained by solving the customary (diagnostic) omega-equation, making allowance for horizontal variations of the static stability. Numerical solutions, with and without inclusion of released latent heat, were used to obtain ageostrophic wind components and their effect upon the production of kinetic energy and vorticity. The following results emerged: (1) the influence of released latent heat was of the same order of magnitude as the effect of dry-adiabatic circulations; (2) to the amplification of the vertical motions that resulted from released latent heat corresponded intensification of the low-level convergence and high-level divergence; (3) the ageostrophic winds associated with these fields of convergence and divergence had components toward lower pressure, thus giving positive contributions to the production of kinetic energy both at low and at high levels; and (4) the computed rate of production of low-level vorticity exceeded the observed rate, and evidence suggests that frictional effects may be important. (Author)

AD-407 574 Div. 2
(TISTP/AW) OTS price $2.60

Operational Applications Lab., Air Force Cambridge Research Center, Washington, D. C.
BIOGRAPHICAL CHARACTERISTICS OF AIR FORCE WEATHER FORECASTERS,
by Alan M. Kershner and William A. Jenner.
Dec 59, 20p.
Proj. 9671, Task 96717
AFCRC TR59 17 Unclassified report

Descriptors: *Weather forecasting, Identification, Air force, Military personnel, Selection, Personnel.

Biographical characteristics which distinguish between good and poor AF weather forecasters, as rated by colleagues, are presented for items pertaining to age, formal school and training, and on-the-job experience for 300 officers, and for 129 warrant and enlisted forecasters. (Author)

Division 3 - CHEMICAL WARFARE EQUIPMENT AND MATERIALS
Division 4 - CHEMISTRY

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-406 956 Div. 3, 27
(TISTM/REB) OTS price $1.10

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
PRESSURE-THRUST RELATIONSHIPS OF VISCO-ELASTIC FLUIDS.
Bimonthly progress rept. no. 1, 8 Apr-31 May 63, by Earl C. Klaubert and Jack Kahrs. 4 June 63, 4p. Rept. 5513 BM1
Contract DA18 108AMC130A
Unclassified report

Descriptors: *Fluids, *Gas generating systems, *Flamethrowers, Liquid rocket propellants, Nitrogen compounds, Tetroxides, Combustion, Gases, Pressure, Recoil mechanisms, Tests, Solid rocket propellants, Gasoline, Flamethrower fuels, Viscoelasticity, Bipropellants.

A study is being made of the physical parameters of gas pressurization (and expulsion) of a viscoelastic fluid (thickened gasoline), and the related problems of means of pressurization and of recoil compensation. As a result of some theoretical studies performed previously, pressurization by means of hot combustion gases was selected for investigation. A liquid bipropellant gas generator utilizing nitrogen tetroxide and unsymmetrical dimethylhydrazine as oxidizer and fuel, respectively, was chosen as being representative of a class of controllable-output hot gas pressure sources. An alternative approach to a source of pressurization and counterrecoil thrust was a solid-propellant rocket with a coolant-diluent bed between the rocket and the flamethrower fuel tank. This configuration will be evaluated concurrently with the liquid bipropellant system. Preparation of a firing site for operation of the flamethrower research device at ranges up to 150 yards is discussed. (Author)

AD-407 487 Div. 3, 17
(TISTB/DGH) OTS price $4.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
CORROSION STUDIES ON BW-CW DECONTAMINANTS, by C. V. Brouillette. 31 Apr 63, 53p.
Technical rept. no. R229
Unclassified report

Descriptors: *Metals, *Steel, *Copper, *Magnesium, *Aluminum, *Brass, *Zinc, *Bronze, *Stainless steel, *Titanium, *Nickel, *Molybdenum, *Manganese, *Vanadium, *Corrosive liquids, *Decontamination, *Bleaching agents, Biological warfare agents, Corrosion, Chemical warfare agents.

The object of the task was to determine the corrosiveness of various BW-CW decontaminants toward the common metals of construction, such as steel, copper, aluminum, magnesium, and zinc, with emphasis placed on the metals and alloys used in the manufacture of high-speed aircraft. Standard decontaminants tested were: (1) STB (super tropical bleach); (2) DANC (6-1/4% dichlorodimethylhydantoin in tetrachlorethane); (3) formalin; (4) beta-propiolactone; and (5) DS-2 (diethylenetriamine/methyl cellosolve/sodium hydroxide-70/28/2). The corrosiveness of these decontaminants to 33 metals and alloys and seven metallic couples was determined by two types of tests: one by partial immersion, one by atmospheric exposure. In general the corrosive attack of the decontaminants on the metals was more severe in the immersion test than in the atmospheric-exposure test. The data indicate that DS-2 and beta-propiolactone are, in general, the least corrosive of the decontaminants evaluated. (Author)

4. CHEMISTRY

AD-407 090 Div. 4
(TISTM/EJH) OTS price $4.60

St. Joseph Coll., W. Hartford Conn.
FORMATION OF ENERGY RICH COMPOUNDS AT LIGHT ACTIVATED SENSITIZER SURFACES.
Final rept.
by Maria Clare Markham. June 63, 43p.
Contract AF19 604 7224, Proj. 6694, Task 669402
AFCRL 63 608 Unclassified report

Descriptors: *Photochemistry, *Organic compounds, *Catalysis, *Catalysts, Polymerization, Chemical reactions, Polymers, Zinc compounds, Oxides, Photosensitivity, Ultraviolet radiation, Photoelectric materials, Semiconductors, Organic pigments, Chlorophylls, Hydrogen compounds, Peroxides.

Study of photosensitized oxidation of isopropyl alcohol to acetone at ZnO surfaces irradiated by light at 3650 A indicates that an excited O anion, probably O2(-), is the photo-activated center formed at the catalyst surface. The alcohol is quantitatively converted to acetone. Formation of high molecular weight polymers on irradiation of methyl methacrylate in dilute solutions at ZnO surfaces confirms the role of O2(-). Both formation and decomposition of H2O2 at irradiated ZnO surfaces are inhibited by cyanides and amides. Extensive IR studies of ZnO catalysts pretreated with solutions of cyanides and amides show strongly adsorbed N-containing fragments. Knowledge of the effects of O and formamide at irradiated ZnO surfaces was utilized to construct photoelectric cells with electrodes made by coating ZnO on Pt mesh. Discovery of a unique and efficient photosensitized transformation of carotene in the presence of pheophytine irradiated by red light is reported. (Author)

AD-407 266 Div. 4
(TISTM/TCG) OTS price $1.60

Naval Research Lab., Washington, D. C.
THE BEHAVIOR OF MONOLAYERS OF PROGRESSIVELY FLUORINATED FATTY ACIDS ADSORBED ON WATER, by Marianne K. Bernett and W. A. Zisman.
21 May 63, 12p.
NRL Rept. 5932 Unclassified report

Descriptors: *Monomolecular films, *Fatty acids, *Water, *Organic compounds, Surface active substances, Surface area, Surface tension, Films, Pressure, pH, Organic solvents, Electrical properties, Electric potential, Surface properties, Fluorides, Absorption, Organic compounds, others.

A study was made on the force-area, surface potential-area, and surface moment-area relations of monolayers of two series of progressively fluorinated fatty acids spread on water at various pH values. The series were n-heptadecanoic acids with substitutions in the 17-position of perfluoromethyl, perfluoropropyl, perfluoropentyl, and perfluoroheptyl groups, and n-undecanoic acids with substitutions in the 11-position of perfluoroheptyl, perfluorooctyl, and perfluorodecyl

groups. In both series the stability of the monolayers at all pH values falls off rapidly with progressively shorter perfluoro segments. The compressed films of all stable acids are in the liquid-condensed state, indicating limiting areas per molecule of 36 to 38 square angstroms. The change in surface potentials of all films is larger than those of any aliphatic acid and shows that the dipole is oriented in the opposite direction. (Author)

AD-407 380 Div. 4, 16
(TISTB/AAR) OTS price $3.60

Technological U. of Delft (Netherlands).
ADVANCED STUDIES ON THE EFFECT OF ULTRAVIOLET LIGHT ON CERTAIN CONSTITUENTS OF NUCLEIC ACIDS AND THEIR INTERACTION WITH ADJACENT WATER MOLECULES UNDER THESE CONDITIONS.
Final technical rept., 1 Nov 61-1 Nov 62,
by W. Berends. 1 Nov 62, 1v.
Contract DA91 591EUC2022
Unclassified report

Descriptors: *Radiation effects, *Nucleic acids, *Ultraviolet radiation, Electromagnetic waves, Water, Molecules, Sensitivity, Polymers, Rats, Liver, Deoxyribonucleic acid, Ribonucleic acid, Tracer studies, Chromatographic analysis, Cells, Amino acids, Dyes.

AD-407 465 Div. 4
(TISTB/AAR) OTS price $2.60

Army Biological Labs., Frederick, Md.
THE THEORY OF ACID DISSOCIATION IN SOLUTION,
by N. A. Izmaylov, tr. by Charles T. Ostertag, Jr.
May 63, 27p.
ABL Trans. no. 735
Unclassified report

Trans. from Physical Chemistry, vol. 28, Issue 11, pp. 2047-2066, 1954 (Copies available from DDC).

Descriptors: *Dissociation, *Acids, Solutions, Molecular properties, Equations, Analysis, Ions, Molecules, Ionization, Electrolytes, Fluorides, Bromides, Iodides, Chlorates, Theory.

AD-407 477 Div. 4
(TISTM/TCG) OTS price $2.60

Emmanuel Coll., Research Language Center, Boston, Mass.
CHINESE (MAINLAND) SCIENCE AND TECHNOLOGY JOURNALS. TABLE OF CONTENTS,
by N, H. Ng. Jan 63, 23p. Rept. no. Chemistry 2
Contract AF19 604 8505
Unclassified report

Descriptors: *Chemical industry, *Abstracts, *Chemical engineering, *Organic compounds, Petroleum, Distilling plants, Oxidation, Reaction kinetics, Vanadium, Catalysts, Vulcanization, Sulfur compounds, Dioxides, Heat transfer, Liquids, Viscosity, Absorption, Cellulosic plastics, Vapors, Chemical equilibrium.

AD-407 552 Div. 4
(TISTM/ODN) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
CALCULATION OF RATE COEFFICIENTS FOR SOME ELEMENTARY REACTIONS. HYDROGEN, DEUTERIUM, AND DEUTERIUM HYDRIDE WITH CHLORINE,
by Roger L. Wilkins. 15 May 63, 24p. TDR169 3230 10TN4
Contract AF04 695 169
SSD TDR63 99 Unclassified report

Descriptors: *Hydrogen, *Deuterium, *Chlorine, *Reaction kinetics, Hydrides, Deuterated compounds, Heat of activation, Isotopes, Chemical reactions, Energy, Theory, Complex compounds, Frequency, Data, Gases.

Rate coefficients were calculated for the reactions of hydrogen, deuterium, and deuterium hydride with chlorine. The potential energy surfaces of the isotopic transition complexes of HCl2 and H2Cl were constructed by the Sato method to match experimental activation energies in accordance with absolute rate theory. The rate coefficients calculated using absolute rate theory are then used to evaluate the relative rates of reaction of H2/HD, H2/D2 with chlorine atoms, and the relative rates of the fast reaction step H+Cl2 compared to the back reaction H+HCl. The results agree very well with the few experimental values reported in the literature. Theoretical calculations show that prior experimental values of the preexponential factors in the Arrhenius-type expression for rate constants are not required in order to obtain better information on the structure and vibrational frequencies of the transition states. Agreement of the activated complex theory with experiment was satisfactory. (Author)

AD-407 601 Div. 4
(TISTM/TCG) OTS price $3.60

Olin Mathieson Chemical Corp., New Haven, Conn.
A NEW SERIES OF ORGANOBORANES III. SOME REACTIONS OF 11,12-DICARBADODECABORANE (12) (CARBORANE) AND ITS DERIVATIVES,
by T. L. Heying, J. W. Ager, Jr., S. L. Clark, R. P. Alexander, and S. Papetti. June 63, 30p.
Technical rept. no. 16
Contract Nonr339500, Task NR356 431
Unclassified report

Descriptors: *Organoboranes, *Boranes, *Organic compounds, Substitution reaction, Chemical bonds, Boron, Hydrogen, Atoms, Metallorganic compounds, Silanes, Lithium compounds, Chemical reactions, Synthesis (Chemistry).

The general participation of carborane and its derivatives in standard organic chemical transformations was established. Reactions of carborane and some functionally substituted derivatives are described. Differences in the reactivity of the hydrogen atoms attached to carbon atoms of carborane from those attached to the boron atoms was demonstrated. (Author)

AD-407 611 Div. 4
(TISTM/EJH) OTS price $1.60

Milan U. (Italy).
NEW HYDRIDES OF TRANSITION METALS.
Annual technical rept. for Nov 61-Oct 62,
by Lamberto Malatesta. 10 Nov 62, 9p.
Grant AF EOAR 62 34
AFOSR 4746 Unclassified report

Descriptors: *Hydrides, *Complex compounds, *Metalorganic compounds, *Organic compounds, Indium compounds, Rhenium compounds, Copper compounds, Silver compounds, Gold compounds, Phosphines, Synthesis (Chemistry), Molecular structure, Absorption spectrum, Molecular spectroscopy, Molecular isomerism, Nuclear magnetic resonance, Transition elements.

Work carried out on iridium complex hydrides, which was published in Gazzetta Chimica Italiana with the title Trihydrido tristriphenylphosphineiridium compounds, is described. Work carried out on rhenium complex hydrides is also

described. Two very interesting new compounds of this class are reported. Research on complex hydrides of gold is reported. This research led to the discovery of some very unusual derivates of zerovalent gold. Research on complex hydrides of copper was undertaken, and a few preliminary results are discussed. (Author)

AD-407 679 Div. 4, 25
(TISTM/TCG) OTS price $3.60

Northwestern U., Evanston, Ill.
ACIDODIETHYLENETRIAMINEGOLD (III) COMPLEXES: PREPARATION, SOLUTION CHEMISTRY AND ELECTRONIC STRUCTURE,
by William H. Baddley, Fred Basolo, Harry B. Gray, Clarita Nolting, and A. J. Poe. 1962, 1v.
Contract AF49 638 315
AFOSR 4701 Unclassified report

In cooperation with Columbia U., New York.

Descriptors: *Complex compounds, *Gold compounds, *Metalorganic compounds, *Organic compounds, Chlorides, Bromides, Solubility, Solutions, Ionization, Electrons, Molecular structure, Chemical equilibrium, Atomic orbitals, Atomic energy levels, Ph, Bases (Chemistry), Reaction kinetics, Chemical bonds, Synthesis (Chemistry).

The preparation of acidodiethylenetriaminegold (III) salts with the general formula (Au(dien)X)X2 (dien = NH2C2H4NHC2H4NH2 and X = Cl(-), Br(-) is reported. The complexes are acids in aqueous solution, ionizing a proton from one of the amine nitrogen atoms. The resulting conjugate bases, (Au(dien-H)X)X (dien-H) = dien less one proton and X = Cl(-), Br(-), were isolated. Equilibrium constants for (N-H) ionization and for the hydrolysis are given. Electronic spectra of the (Au(dien)X)(2+) and (Au(dien-H)X)(+) complexes are assigned using a molecular orbital level classification. (Author)

5. COMMUNICATIONS

AD-406 902 Div. 5, 15
(TISTP/MFA) OTS price $7.60

Vitro Labs., West Orange, N. J.
COMMUNICATION SYSTEMS TECHNIQUE BASED ON FUNDAMENTAL CONCEPTS OF JACQUES HADAMARD.
Final rept.,
by Richard G. Segers. 10 June 63, 70p.
VL2262 13 0
Contract AF30 602 2649, Proj. 4519, Task 451903
RADC TDR63 177 Unclassified report

Descriptors: *Communication systems, Integral equations, Fourier analysis, Modulation, Partial differential equations, Noise, Circuits, Communication theory, Polynomials, Integral transforms, Design, Functional analysis.

A variety of fundamental investigations, with common analytical foundation in the work of Jacques Hadamard, was conducted for the purpose of development of advanced communications systems. Chapter I presents a functional analysis approach to the demodulation problem as formulated in a system of integral equations by D. C. Youla. Its principal content is the discussion of the engineering significance of a quadratic variable principle that underlies the Youla formulation. Chapter II concentrates on mathematical considerations with the dual purpose of completing the arguments involved in Chapter I and indicating where forward work is needed to enlarge the domain of the validity of the theory of Chapter I. Chapter III presents communication techniques derivable from incidence matrices of balanced incomplete block design configurations. (Author)

AD-407 306 Div. 5, 8
(TISTE/OHD) OTS price $1.60

Electro Physics Lab., ACF Electronics, Bladensburg, Md.
NOMOGRAMS FOR OBTAINING THE ARRIVAL ANGLE AND BEARING OF RADIO WAVES FROM MEASUREMENTS OF PHASE DIFFERENCE BETWEEN THREE STATIONS ARRANGED IN AN EQUILATERAL TRIANGLE,
by M. Lindeman Phillips. 23 Apr 63, External Technical Memorandum no. E15
Unclassified report

Descriptors: *Nomographs, *Angle of arrival, Radio receivers, Phase measurement, Trigonometry, Determinants, Mathematical analysis, Radio waves.

The nomographic procedures described are devised for facilitating computation of values for wave arrival angles obtained from a 3-station receiver system. The original effort was conducted to simplify the resolution of the angle-of-arrival vector from component measurements made on a wideband '3-port' receiving system at a field site. The particular 3-port configuration utilized three wideband, vertically polarized, monopole antennas placed at the apexes of an equilateral triangle. (Author)

AD-407 343 Div. 5, 8
(TISTE/OHD) OTS price $12.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
INVESTIGATION OF ANALOG AND DIGITAL COMMUNICATION SYSTEMS (PHASE 3 REPORT).
Final rept., Feb 62-Feb 63,
by John G. Lawton. May 63, 175p. UA1420 S 3
Contract AF30 602 2210, Proj. 4519, Task 451903
RADC TDR63 147 Unclassified report

Descriptors: *Communication systems, *Frequency modulation, *Digital systems, *Analog systems, Mathematical analysis, Pulse modulation, Coding, Data transmission systems, Communication theory.

The results of fundamental investigations on a variety of topics related to the optimization of analog and digital data communication systems are presented. The maximum likelihood estimation of FM-modulated signals is investigated. A study is made of the threshold phenomenon in FM reception with an ideal discriminator and a postdetection Wiener filter for the case of a random modulation function. Information theory is applied to establish bounds on the performance of analog communications systems. The performance of PCM systems for transmitting analog information is investigated and compared with theoretical bounds for systems of prescribed complexity. Previous work on the partial ordering of digital channels by the criterion of inclusion was extended. The analysis of the optimization o. N-ary digital systems operating over a dispersive channel, which was begun during a previous phase of the contract, is further advanced. (Author)

6. DETECTION

AD-406 843 Div. 6, 2
(TISTP/MFA) OTS price $1.60

Illinois State Water Survey, Urbana.
INVESTIGATION OF THE QUANTITATIVE DETERMINATION OF POINT AND AREAL PRECIPITATION BY RADAR ECHO MEASUREMENTS.
Quarterly technical rept. no. 6, 1 Jan-31 Mar 63,
by E. A. Mueller, G. E. Stout and William C. Ackermann. 31 Mar 63, 13p.
Contract DA36 039sc87280, Task 3A99 07 001 01
Unclassified report

Descriptors: *Radar echo areas, *Radar, *Raindrops, Instrumentation, Cameras, Trafficability, Radar tracking, Radar antennas, Measurement, Meteorology, Analysis.

Raindrop cameras were reinstalled on the East Central Illinois Raingage Network. Results of stratifying drop size data from Majuro with respect to height of the condensation level are presented. These indicate that there are significant difference in the distribution, but the explanation of these differences is not clear. An example of a time sequence of drop size data obtained at Mt. Withington, New Mexico, is presented.

AD-406 859 Div. 6, 12
(TISTP/AW) OTS price $7.60

RCA Service Co., Inc., Patrick Air Force Base, Fla.
THE ACCURACY OF AMR INSTRUMENTATION,
by H. P. Mann. 17 Dec 62, 181p.
AFMTC TDR63 3
Unclassified report

Supersedes AFMTC TR61-23, AD-270 800.

Descriptors: *Tracking, *Optical tracking, *Radar tracking, *Guided missile tracking systems, Spacecraft, Guided missile ranges, Theodolites, Ballistic cameras, Photogrammetry, Continuous wave radar, Doppler radar, Radar, Radar equipment, Range finding, Statistical distributions, Statistical analysis, Measurement, Least squares method, Series, Instrumentation, Errors.

This report gives estimates of the accuracy of tracking instrumentation in use on the Atlantic Missile Range, provides a definitive discussion of the character of the errors encountered, and discusses methods used to determine estimates of errors. Comprehensive statements are made concerning the errors of measurement for the various instrumentation systems. Included also is a section on the determination of the accuracies of reduced data in position, velocity, and acceleration. The instrumentation accuracies listed in this report are conservative estimates which are used as standards for the evaluation of the accuracy of tracking system performance on a test-by-test basis. (Author)

AD-406 933 Div. 6
(TISTP/MFA) OTS price $1.60

Watkins-Johnson Co., Palo Alto, Calif.
APPLIED RESEARCH ON TECHNIQUES FOR LIGHT MODULATION DETECTION.
Addendum to interim engineering rept. no. 3, 1 Jan-31 Mar 63,
by S. E. Sobottka. 31 Mar 63, 10p.
W J63 610R12 1
Contract AF33 657 8917
Unclassified report

Descriptors: *Electron guns, *Light, *Detection, Lasers, Phototubes, Microwaves, Photocathodes, Mirrors, Diffraction, Range finding, Telemeter systems, Design, Sensitivity, Propagation, Modulation, Electron beams.

The relative advantages of convergent flow gun and linear flow gun traveling-wave phototubes are discussed. Convergent flow guns are preferable in the following two situations, where it is assumed that the light signal is collected and focased onto the photocathode by a telescrope of some kind: (1) The light source is not a point and the image is larger than the photocathode, in this case the receiver sensitivity is proportional to the cathode area; (2) The light sources is effectively a point, e.g., a laser source, in this case the image may be smaller than the cathode, but the larger the photocathode, the less directional is the receiver--an important consideration when the source and receiver cannot be perfectly aligned, and atmospheric effects cause virtual motion of the source. Satellite telemetry, and laser range finding systems are typical examples of this situation. (Author)

AD-407 251 Div. 6, 25, 30
(TISTP/HSS) OTS price $1.60

Little, Arthur D., Inc., Cambridge, Mass.
NEAR INFRARED BACKGROUND CLUTTER AND ATMOSPHERIC TRANSMISSION. INSTRUMENTATION.
Semiannual rept.,
by E. C. Reifenstein, III, P. C. v. Thuna and H. H. Blau, Jr. May 63, 9p.
Contract AF04 695 202
SSD TDR63 146 Unclassified report

Descriptors: *Infrared research, *Interference, Infrared detectors, Instrumentation, Infrared phenomena, Atmospherics, Signal-to-noise ratio, Solar spectrum, Atmosphere, Measurement, Attenuation, Radar clutter, Background, Infrared radiation.

The instrumentation phase of an infrared background measurement program is summarized. Its objective is to obtain infrared background data from a U-2 aircraft that will assist in the design and evaluation of future space-based infrared detection systems. It is planned to measure the statistics of background clutter in the 1-3 micron region with 0.10 micron resolution for a variety of geometrical conditions of solar illumination and viewing and to measure solar spectra for a range of aircraft altitudes and solar elevations. This report, which covers the period from November 1962 to May 1963, deals with the instrumentation and data gathering aspects of the program. (Author)

AD-407 557 Div. 6
(TISTP/HSS) OTS price $11.50

Radiation Lab., U. of Michigan, Ann Arbor.
STUDIES IN RADAR CROSS SECTIONS XLVIII - DIFFRACTION AND SCATTERING BY REGULAR BODIES II: THE CONE,
by R. E. Kleinman and T. B. A. Senior. Jan 63, 143p. Rept. no. 3648 2 T; Scientific rept. no. 5
Contract AF19 604 6655, Proj. 5635, Task 563502
AFCRL 63 29 Unclassified report

Descriptors: *Radar echo areas, *Radar echo areas, Scattering, Theory, Boundary value problems, Conical bodies, Configuration, Microwaves, Radar reflections, Diffraction Conical bodies.

The objective is to determine means for computing the radar cross section of objects in a variety

of different environments. This has led to an extension of the investigation to include not only the standard boundary-value problems, but also such topics as the emission and propagation of electromagnetic and acoustic waves, and phenomena connected with ionized media. (Author)

AD-407 584 Div. 6, 19, 11
(TISTP/AW) OTS price $15.50

Emerson Electric Mfg. Co., Santa Barbara, Calif.
FEASIBILITY STUDY OF TERRAIN SENSORS AND TERRAIN SENSING.
Final technical rept.,
by Harry F. Gilmore, Jr., Richard C. Ramsey, and Thomas R. Fahy. 28 Dec 62, 228p.
Contract DA04 495ORD3569
Unclassified report

Descriptors: *Optical scanning, *Range finding Optical equipment, Vehicles, Automatic, Feasibility studies, Identification, Terrain.

Optical techniques were studied for application in a terrain sensor which measures the profile and consistency of the terrain ahead of a cross-country military vehicle and provides information for the actuation of an active vehicle suspension system. Automatic optical ranging techniques were found to be suitable for terrain profile sensing. Optical methods of spatial and spectral analysis of an image of the terrain were shown to have considerable promise for consistency determination. Preliminary designs for equipment for terrain profile and consistency sensing are used as a basis for performance evaluation. (Author)

AD-407 598 Div. 6, 12
(TISTP/HSS) OTS price $7.60

RCA Service Co., Inc., Patrick Air Force Base, Fla.
RADAR 3.16 ACCURACY EVALUATION.
Final rept.,
by Edgar P. Hall and A. E. Hoffmann-Hyden.
21 Feb 63, 27p. Systems Analysis Technical rept. no. 25
Contract AF08 606 5300
AFMTC TDR63 4
Unclassified report

Descriptors: *Radar tracking, Antimissile defense system, Guided missile tracking systems, Errors, Radar equipment, Tracking, Guided missile detection.

Accuracy and tracking performance of the Atlantic Missile Range AN/FPS-16 radar No. 3.16, located at Grand Bahama Island, is evaluated from data collected during two typical missile tracking operations. The results show that the instrument performance was quite consistent with specified capabilities but that operational circumstances and extraneous factors may give rise to apparent systematic errors of sizeable magnitude. The issue of confounded flight test data can be prevented by appropriate editing of the radar measurements, based on recognition and correct interpretation of the errors. (Author)

7. ELECTRICAL EQUIPMENT

AD-407 111 Div. 7
(TISTM/BRW) OTS price $8.10

Sonotone Corp., Elmsford, N. Y.
DESIGN AND MANUFACTURE OF SEALED NICKEL-CADMIUM CELLS OF CYLINDRICAL DESIGN TO SIGNAL CORPS TECHNICAL REQUIREMENT SCL-7504A,
JUNE 28, 1961.
Final rept., 1 Dec 59-31 Mar 63,
by Francis Alliegro. 31 Mar 63, 79p. 4
Contract DA36 039sc84496, Task 3G1803 001 02
Unclassified report

Descriptors: *Storage batteries, Batteries (Components), Battery separators, Anodes (Electrolytic cells), Cathodes (Electrolytic cell), Alkaline cells, Electrolytes, Seals (Stoppers), Plastic seals, Cadmium, Nickel, Tests, Design.

The 60 cells of each of three sizes (10 A.H., 50 A.H. and 100 A.H.) were manufactured. The qualification tests of SCL-7504A were successfully passed and all cells were delivered. All 10 A.H. and 50 A.H. cells had teflon sealed terminals. In the 100 A.H. size, 40 cells had teflon seals and 20 cells had ceramic seals. Fifty each of the 50 A.H. and 100 A.H. cells were partially scored to immobilize the core assembly in order to withstand the severe vibration and shock requirements of SCL-7504A. Parts lists and pertinent drawings of all types of cells are included in this report. (Author)

AD-407 262 Div. 7
(TISTE/CAM) OTS price $6.60

Burndy Corp., Norwalk, Conn.
FLAT FLEXIBLE CABLE CONNECTOR,
Final rept.,
by Robert G. Knowles. 18 Feb 63, 55p.
Contract DA36 039sc87274
Unclassified report

Descriptors: *Electric cables, *Electric connectors, Printed circuits, Miniature electrical equipment, Dielectrics, Installation, Reliability (Electronics), Bonding, Electric insulation, Design, Mathematical analysis, Stresses, Gaskets, Tests, Electric terminals.

Effort was made to promote the development of better methods of terminating flat flexible cable, and inspiring original approaches to simplify its installation. The primary requirements for the new type connector were that the connector be capable of being installed in the field with a minimum of tooling; and, that it provide a highly reliable environmentally sealed connector. Secondary requirements were that the connector mate with, or be adaptable to, the ultraminiature printed circuit connectors; that it be suitable for rack and panel applications, and that it be fitted with or be capable of being fitted with latches to permit its use as an unmounted disconnect. Summarized are the various changes from the original concept, and the reasons for them; the research work on the insulation piercing concept; and, a brief analysis of the results of the tests. (Author)

AD-407 293 Div. 7
(TISTE/CAM) OTS price $2.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
HERO SUPPORTING STUDIES.
Monthly progress rept. no. 7, 1-3 Jan 63,
by Norman P. Faunce and Paul F. Mohrbach.
31 Jan 63, 14p. Rept. no. P B1980 7
Contract N178 8102
Unclassified report

Descriptors: *Electromagnetic waves, *Transformers, *Tantalum capacitors, *Electric potential, Radiofrequency power, Temperature, Measurement, Reduction, Standing wave ratios, Calibration, Attenuation, Explosives initiators, Hazards, Test methods.

Two low band-pass transformers (LBT's) were found to have more than 40 db loss at 30 and 250 Mc, when terminated in one ohm. Data show that this loss can be reduced to as little as 15 db if the continuity of the shield from input to output is broken. Temperature rise did not exceed 85 C with 10 watts for one unit, and 125 C with 12 watts for the other. Repeated tests to confirm the validity of the voltage min-max measurement method are again positive, but the presence of an unaccountable loss adds some confusion. It is conjectured that the power level measured at various points in the system should show a gradual, almost linear, decrease from system input to termination. Data obtained indicates a severe reduction in power level at the front end of the system, but decreasing as expected from thereon. A modification of the basic technique required to offset interference present during these tests does not appear accountable. (Author)

AD-407 371 Div. 7, 26
(TISTE/JWS) OTS price $4.60

General Electric Co., Philadelphia, Pa.
ADVANCED SOLAR THERMIONIC GENERATORS.
Quarterly technical progress rept. no. 3, Mar-May 63,
by R. R. Herrick, R. C. Keyser and L. L. Dutram.
June 63, 37p.
Contract AF33 657 8947, Proj. 8173, Task 817305 16

Unclassified report

Descriptors: *Thermionic generators, Temperature, Life expectancy, Manufacturing methods, Rhenium, Tantalum, Molybdenum, Electron beams, Welding, Brazing, Cathodes Electric potential, Electric currents, Cesium, Solar radiation.

Fabrication of advanced solar thermionic converters, both B and C series, is outlined, noting the significant problem areas. Results of testing of the B series have given performance up to 9.6 watts/cm2 at 1950 K and 3.0 watts/cm2 at 1550 K. Converter C-3 has completed a 510 hour test, including 210 hours of thermal cycling. Electron beam welding of rhenium resulted in a brittle phase and leaking joints. (Author)

AD-407 384 Div. 7
(TISTE/JBM) OTS price $1.60

Westinghouse Electric Corp., Lima, Ohio.
SOLAR THERMOELECTRIC GENERATOR SYSTEM CONCEPT AND FEASIBILITY STUDY.
Quarterly rept. no. 5, 15 Feb-15 May 63,
by J. L. McCabria. 15 May 63, 13p.
Contract AF33 657 8089

Unclassified report

Descriptors: *Thermoelectricity, *Solar radiation, *Generators, Feasibility studies, Models (Simulation), Spacecraft, Electric power production, Theory, Life expectancy, Lithium compounds, Hydrides, Stainless steel, Thermocouples, Storage, Thermodynamics, Tests.

Research continued on a program to establish the feasibility of a solar thermoelectric generator for use in space vehicles. All of the thermal storage units planned for evaluation have been tested and analyzed. The final unit was cycled for over 1000 hours. From an initial value of 92.5% lithium hydride within the container 91.1% still remained. An extension program has been finalized and work initiated on it. (Author)

AD-407 420 Div. 7, 17, 2
(TISTP/MFA) OTS price $1.60

Naval Research Lab., Washington, D. C.
CALCULATION OF MAGNETIZATION VS TEMPERATURE CURVES FOR FERRIMAGNETIC MATERIALS,
by E. Prince. 21 May 63, 11p.
Proj. RR002 06 41 5000
NRL Rept. 5935

Unclassified report

Descriptors: *Ferromagnetic materials, *Ferromagnetism, *Temperature, Magnetic properties, Crystal structure, Brillouin zones, Functions, Ferrites, Lithium, Programming (Computer), Ions, Neutron diffraction analysis, Equations, Magnetism, Field theory, Measurement.

The equations implicit in Neel's molecular-field theory of ferrimagnetism are set out in considerable detail. The general equations which pertain to magnetic structures with crystallographic long-range order are derived, and the specific pair of transcendental equations which must be satistied in the case of two sets of antiparallel magnetic spins is written down in a form which is amenable to solution by automatic computer methods. The dominant interaction is expressed in terms of the magnetic transition temperature, while the two smaller interactions are given as fractions of the dominant one. A computation of the shapes of the curves of the magnetization as a function of temperature shows that, while magnetic and neutron diffraction measurements can determine quite precisely the value of a linear function of these fractions, the actual values of the individual fractions are less precisely determined. It follows than any experimental deviation from the calculated curves is due to an inadequacy of the theory rather than to incorrect values of the parameters. Finally, methods of attack for computation of more complex cases are discussed. (Author)

AD-407 489 Div. 7, 25
(TISTE/JBM) OTS price $2.40

General Instrument Corp., Newark, N. J.
SOLAR FLAT PLATE THERMOELECTRIC GENERATOR RESEARCH.
Quarterly rept. no. 1, 1 Mar-1 June 63.
15 June 63, 14p.
Contract AF33 657 10335, Proj. 8173, Task 817302

Unclassified report

Descriptors: *Solar panels, *Thermoelectricity, *Generators, Test equipment (Electronics), Tests, Optical coating, Electric power productions, Solar radiation, Spacecraft, Fixed contracts, Plastics, Aluminum, Design, Structural parts, Optical properties, Thermal radiation, Semiconductor, Tellurium alloys, Bismuth alloys, Lead alloys, Processing, Nickel, Gold, Aluminum, Reflectors, Honeycomb cores, Sandwich construction, Bonding, Temperature.

Research concerns the development of solar flat plate thermoelectric generators for spacecraft. A solar flat plate thermoelectric generator consists of a collector plate with an optically selective coating, small size semiconductor thermoelements, a radiator plate and a support structure. Three months of research and development work on this space auxiliary power system is described. The technical problem areas investigated include; collector coatings, thermoelectric materials and contacts and support structures. Collector coating samples suitable for evaluation

were obtained. Test equipment for thermal cycling tests of solar thermoelectric panels was fabricated. Panels using a plastic foam support structure and on aluminum honeycomb support structure were fabricated and tested. A number of different thermoelectric materials were tested for efficiency at various operating temperatures. (Author)

AD-407 525 Div. 7
(TISTP/FEM) OTS price $3.60

Harshaw Chemical Co., Cleveland, Ohio.
LARGE AREA THIN FILM CADMIUM SULFIDE SOLAR CELL ARRAY INVESTIGATION.
Quarterly technical progress rept. no. 3, 15 Mar-15 June 63,
by J. C. Schaefer, R. J. Humrick, E. R. Hill.
21 June 63, 25p.
Contract AF33 657 9975, Proj. 8173, Task 817301
Unclassified report

Descriptors: *Solar cells, *X-ray diffraction analysis, Crystals, Cadmium, Sulfides, Photographic analysis, X-ray photography, Purification, Distillation, Semiconducting films, Sulfur, Diodes (Semiconductor), Luminescence, Cadmium compounds, Microscopy.

A 5.1% thin-film cell was produced on a 1 in. x 1 in. substrate. This result compares favorably with the maximum efficiency of 5.4% reported for a single crystal CdS cell. A procedure for upgrading low efficiency cells to the average efficiency leevel was also developed. A nondestructive x-ray technique was used successfully to photograph dislocations in single crystal CdS. This procedure promises to yield a fund of information. Efforts to produce an ultrapure CdS by distillation of the elements and subsequent reaction is underway. Work was carried on in the analysis of the I-V data and spectral response in an effort to catalog this data in the form of a model. The present data can be in an effort to catalog this data in the form of a model. The present data can be made to fit a p-n junction with photoconductive series and shunt resistances. Some reject 'shorted' cells were studied at low temperatures where the I-V curve begins to resemble a backward diode. Injection luminescence with very low conversion efficiency was observed with the radiation lying in the band between 1 and 1.5 ev. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-406 825 Div. 8, 2, 25
(TISTP/AW) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
FARADAY ROTATION NEAR THE TRANSVERSE REGION OF THE IONOSPHERE,
by George A. Dulk. Apr 63, 32p. Rept. no. 1200
Proj. 1A011001B021
Unclassified report

Descriptors: *Ionospheric propagation, *Ionosphere, Radio signals, Equations, Satellites (Artificial), Wave transmission, Errors, Communication satellites (Active), Polarization, Electron density, Magneto-optic effect, Magnetic fields.

It is shown that some of the equations usually used to describe Faraday rotation are incorrect for the case of propagation through an anisotropic magnetic field when the cosine of the angle between the magnetic field and the wave normal changes sign along the ray path. Such a case is common when transmissions are from a high altitude satellite in the region of the ionosphere where the direction of propagation is nearly perpendicular to the earth's magnetic field. Use of the uncorrected equations can result in misinterpretation of the data. The corrected equations are given and are shown to be consistent with measured Faraday rotation. With the corrected equations used in a ray tracing program, an analysis is made of errors resulting from the use of several approximations near the transverse region. The approximations investigated are: (1) quasi-longitudinal propagation, (2) straight line propagation, and (3) use of an effective ionospheric height. (Author)

AD-406 826 Div. 8
(TISTE/PAR) OTS price $5.60

Electrical Engineering Research Lab., U. of Ill., Urbana.
RESEARCH STUDIES ON PROBLEMS RELATED TO ANTENNAS.
Quarterly progress rept. no. 2, 1 Dec 62-28 Feb 63.
15 Apr 63, 45p.
Contract AF33 657 10474, Proj. 6278, Task 6278 01
Unclassified report

Descriptors: *Antennas, Antenna radiation patterns, Dipole antennas, Coupled antennas, Slot antennas, Electrical impedance, Spiral antennas, Conical antennas, Helical antennas, Electric fields, Magnetic fields, Lens antenna, Waveguides, Antenna feeds, Mathematical analysis, Millimeter waves, Antenna lobes, Antenna configurations.

Contents:
Radiation from periodic structures
Log-periodic cavity-backed slot antennas
Log-periodic magnetic-current antennas
Log-spiral antennas
Log-periodic zigzag antennas
An integrated antenna amplifier
Wave propagation along helical conductors
Investigation of a class of periodic structures
Transmission between antennas when the far field approximation does not apply
Radiating lens illuminated from a Goubau beam-waveguide
Zone phase plates
Study of a class of grating problems

AD-406 854 Div. 8
(TISTE/CAM) OTS price $1.60

Harry Diamond Labs., Washington, D. C.
DECADE SWITCH FOR SETTING MAGNETIC CORES,
by Gerald W. Kinzelman. 20 May 63, 18p. TR1129
Proj. DA5N12 15 034 and Proj. 40400
Unclassified report

Descriptors: *Rotary switches, *Sequence switches, Switching circuits, Printed circuits, Coding, Magnetic cores.

A description is presented of the design of a special single-wafer decade switch intended to replace a conventional six-wafer 10-position switch for setting magnetic core circuits. The new switch is less than one-third the size of the older design and its reduced complexity makes it potentially more reliable. (Author)

AD-406 863 Div. 8, 25, 15
(TISTP/MH) OTS price $14.50

Electron Physics Lab., U. of Michigan, Ann Arbor.
NOISE IN MULTI-DIMENSIONAL ELECTRON STREAMS,
by Cheng P. Wen. Mar 63, 202p. TR59
Contract AF33 657 8050, Proj. 4156, Task 415603
Unclassified report

Doctoral thesis.

Descriptors: *Electron beams, Transport properties, Electric potential, Digital computers, Mathematical analysis, Models, Magnetic fields, Velocity, Distribution, Statistical functions, Electron density, Electric fields, Monte Carlo methods, Noise.

The purpose of this investigation is to study the noise transport and reduction phenomena in multi-velocity electron beams with significant potential variations in the transverse direction. Correlations between the noise reduction mechanism and the multi-dimensional nature of the electron beams are sought. The investigation was carried out by means of a high-speed digital computer employing two different numerical methods. The mathematical model assumes an infinite confining magnetic field so that transverse motions are not allowed. In addition a one-dimensional half-Maxwellian velocity distribution function is considered for the electrons at the potential minimum. Details of the derivation of a small-signal linearized Boltzmann equation in terms of a statistical electron density function and the electric field in a two-dimensional space-charge-limited diode are presented, together with some discussion on the singularities in the boundary conditions and the formulation of the a-c electric fields. To facilitate a solution of the transport equation, velocity classes are introduced as an approximation so that digital techniques become applicable. Haus's noise theory for small-signal longitudinal beam devices is employed to evaluate the noise transport characteristics of the two-dimensional electron beam. (Author)

AD-406 896 Div. 8
(TISTP/MFA) OTS price $4.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
SWITCHING NETWORKS BY LINEAR GRAPH THEORY,
by P. Lavallee. 13 May 63, 42p. PIBMRI 1146 63
Grant AF AFOSR 62 295
Unclassified report

Descriptors: *Networks, *Circuits, Algebras, Matrix algebra, Algebraic topology, Linear systems, Functions, Sequences, Number theory, Switching circuits, Synthesis.

An analytic tool in the realization of circuit matrices is presented. The method is based on forming linear trees with each row of a fundamental circuit matrix and combining them to form a tree of the graph. With this method, more difficult problems in the synthesis of contact networks by linear graph theory can be considered. A method of simultaneous synthesis is developed in which two or more switching functions are realized by sharing contacts in an optimal form. Finally the multi-terminal procedures are extended to the synthesis of non-bilateral, 1 port switching networks. (Author)

AD-406 921 Div. 8, 25
(TISTE/JWS) OTS price $8.80

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
AN INVESTIGATION OF THE LAMINARITY OF FLOW IN A MAGNETICALLY CONFINED ELECTRON BEAM,
by D. D. Hallock. 15 Sep 62, 77p. TR19; RR EE539
Contract AF30 602 2573
Unclassified report

Report on Linear Beam Microwave Tubes.

Descriptors: *Electron beams, *Electron optics, Mathematical models, Electron guns, Vacuum apparatus, Temperature, Magnetic fields, Cathodes (Electron tubes), Anodes (Electron tubes), Modulation, Coils, Dynamics, Focusing.

A study of the electron flow in a Brillouin beam was made, which yielded information that provided an insight into the electron behavior in a medium-power Brillouin beam. It was shown that the beam can display a high degree of laminarity at a beam voltage of 5000. The trajectory equation of the outer edge electron in the laminar model of the beam was linearized and shown to give results in good agreement with the experimental observations, when the focusing field was less than twice the Brillouin field. It was also shown that the beam can be focused at the calculated Brillouin field within the limits of experimental error. The differences between the theoretical predictions and the experimental observations, which arose from limitations either of the experimental apparatus or the theory, are discussed. The effects of thermal velocities are considered particularly at low beam voltages. (Author)

AD-406 923 Div. 8
(TISTE/JWS) OTS price $7.60

Cornell U., School of Electrical Engineering, Ithaca, N. Y.
RESPONSE OF KLYSTRONS TO NANOSECOND PULSES,
by N. Bose. 30 Sep 62, 69p. TR21; R R EE542
Contract AF30 602 2573
Unclassified report

Report on Linear Beam Microwave Tubes.

Descriptors: *Klystrons, *Electron beams, Mathematical models, Taylor's series, Differential equations, Partial differential equations, Velocity, Electromagnetic waves, Fourier analysis, Electric fields, Pulse modulation, Electromagnetic properties, Mathematical analysis.

This investigation uses ballistic theory in the analysis of the behavior of an electron beam passing through alternate gap and drift regions, with the gap regions having excitation fields. The analysis develops the response to a complicated frequency spectrum of the drive signal. First the double frequency case is analyzed. Relativistic effects are taken into account and their influence on the current response studied. Then the theory is extended to the more complicated case of a Gaussian spectrum. The first-order bunching theory is used to plot current response curves. An estimate of the pulse distortion resulting from nonlinear electron beam dynamics is obtained from the curves. It is also of interest that the envelope shape of the exit current is almost completely independent of the r-f frequency. The large-signal, finite-gap analysis is carried out, and the results extended to the multiple-cavity klystron. (Author)

AD-406 924 Div. 8, 25
(TISTE/CAM) OTS price $9.10

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
BALLISTIC ANALYSIS OF MODULATED ELECTRON BEAMS,
by I. Turkekul. 30 Oct 62, 86p. TR24; RR EE 547
Contract AF30 602 2573
Unclassified report

Report on Linear Beam Microwave Tubes.

Descriptors: *Klystrons, *Electron beams, *Modulation, Ballistics, Velocity, Space charges, Cavity resonators, Differential equations, Integration, Motion, Programming (Computers), Energy, Dynamics, Fourier analysis, Series, Electron density, Mathematical analysis.

A ballistic analysis is described of an electron beam in a two-cavity klystron, which was assumed to have infinite cross section, negligible space charge, nonrelativistic velocities, and gridded finite gaps. The operating parameters of a catcher gap for maximum efficiency and the velocity-filtering capabilities of a r-f gap interacting with a spent beam, at large signals were investigated. The behavior of an electron beam in a buncher gap was investigated using a graphic analysis based on the results given by the digital computer. The velocity and current distributions emerging from this gap were formulated. The graphic results were approached by successively approximating the transit-time correction factor. The results obtained by successive approximation were then used as initial conditions in analyzing the behavior of the electron beam in the first drift space. A Fourier series was derived which describes the various harmonics of the beam current as functions of the operating parameters of the buncher gap and the drift space, for large signals. The results are found to be in agreement with those in the literature. The exit current and the exit velocity from the second gap were formulated as implicit functions of entrance and exit times in forms applicable to a digital computer, and the operating conditions of the second gap were taken as parameters. The computer data were sorted for both a catcher gap and a velocity-filter gap by kinetic energy calculations. The catcher gap selected had an efficiency of 23.995 per cent. (Author)

AD-406 926 Div. 8
(TISTP/WH) OTS price $2.60

Thermo Electron Engineering Corp., Waltham, Mass.
ADDITIVE CONVERTER STUDIES.

Quarterly rept.,
by A. L. Hyland. June 63, 19p. 36 63
Contract AF33 657 10130, Proj. 8173,
Task 817305 28

Unclassified report

Descriptors: *Thermionic converters, *Diodes (Electron tubes), Cesium compounds, Fluorides, Chlorides, Oxygen compounds, Rhenium, Additives.

An account of the cesium characteristics of the experimental converter is given and the correlation to other rhenium emitter diodes is discussed. (Author)

AD-407 028 Div. 8
(TISTE/OHD) OTS price $3.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
ANTENNA RESEARCH.
Final engineering rept. 12 Nov 56-11 Nov 57.
15 Nov 57, 29p. Rept. no. 723 5

Unclassified report

Subcontract to North American Aviation, Inc., Columbus Ohio, Contract NOa(s)56 978.

Descriptors: *Electronic equipment, *Transformers, *Antennas, Antenna radiation patterns, X band, Theory, Dielectrics, Antenna components, Polarization.

AD-407 029 Div. 8, 12
(TISTE/JBM) OTS price $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
STUDY OF ELECTROMAGNETIC WINDOW DIELECTRIC TECHNIQUES.
Final rept. 16 Sep 60-15 Sep 61.
15 Sep 61, 9p. Rept. no. 1180 7
Contract AF33 616 7614, Proj. 1 670 4161,
Task 42039

Unclassified report

Descriptors: *Electric scanners, *Antennas, *Radomes, Measurement, Antenna configurations, Digital computers, Infrared equipment, Supports, Broadband, Antenna radiation patterns, Waveguides, Integrated circuits, Electric fields, Analysis, Temperature, Power, Waveguide windows, Lens antennas, Diffraction, Thermal stresses, Thermal conductivity, Nose cones.

A study was made of the performance of an electronic-scan antenna when mounted in a quadripod. Measurements were obtained also of the diffraction by other metal objects in front of an antenna. Good agreement is observed between the measurements and theoretical results obtained with the aid of a digital computer. The computer program is designed to predict the effects of metal supporting structures, pitot booms, and infrared systems which may be mounted in front of a radar antenna. Two techniques were developed for the analysis and design of inhomogeneous radomes. Step-by-step numerical integration is used in cases where the permittivity gradient is large. The WKB method is more convenient and is accurate when the permittivity gradient is small. These techniques are useful in analyzing the effects of thermal gradients on radome performance, and in designing broadband radomes with variable density or variable loading. The factors affecting the power-handling capacity of a radome are considered briefly. The power-handling capacity is generally limited by thermal failure rather than voltage breakdown in the radome. (Author)

AD-407 059 Div. 8, 15
(TISTP/FEM) OTS price $4.60

Parke Mathematical Labs., Inc., Concord, Mass.
ON THE MINIMAL WEIGHT OF BINARY GROUP CODES,
by L. Calabi and E. Myrvaagnes. Mar 63, 35p.
SR7
Contract AF19 604 7493
AFCRL 63 105

Unclassified report

Descriptors: *Communication theory, Algebra, Number, Inequalities, Difference equations, Algebraic geometry, Functions, Coding, Linear systems.

Let w(n,k) be the largest integer such that there exists a binary group code (n,k) all of whose non-zero elements have weight equal to or larger than w(n,k). In this report values of w(n,k) are given for $o < k <$ or = 6 and $k <$ or = $n <$ or = 100, as well as for $o < k <$ or = $n <$ or = 24. Further, new upper and lower bounds are obtained which are easy to compute and, in certain regions, better than other known bounds. (Author)

AD-407 112 Div. 8
(TISTP/MH) OTS price $2.60

Harvard U., Cambridge, Mass.
RELATIVE INTENSITY MEASUREMENTS IN MICROWAVE SPECTROSCOPY,
by Alan S. Esbitt and E. Bright Wilson, Jr.
1963, 1v.

Unclassified report

Descriptors: *Microwave spectroscopy, Measurement, Radiofrequency spectroscopy, Gas analysis, Gases, Wave guides, Ferrites, Attenuators, Errors, Molecular properties, Nuclear properties, Intensity.

A method is described for the measurement of peak intensity ratios of gas phase microwave absorption lines. Large errors associated with multiple reflections in the waveguide were eliminated by careful design and the use of ferrite isolators. Detector nonlinearities were neutralized by using a precisely calibrated step attenuator allowing both lines involved in a ratio to be displayed with approximately the same amplitude. Means of minimizing additional ources of error are discussed. Application of the method to a number of problems indicates that ratios accurate to a few percent can be obtained. (Author)

AD-407 120 Div. 8, 20
(TISTP/FEM) OTS price $1.10

Alabama U., University.
SUBMILLIMETER RADIATION FROM RELATIVISTIC ELECTRONS.
Final technical rept.
3 May 63, 6p.
Grant AF AFOSR61 69

Unclassified report

Descriptors: *Electromagnetic waves, *Electron beams, *Waveguides, C band, Electron accelerators, Calibration, Spectrum analyzers, Magnets, Superhigh frequency, Linear accelerators, Design.

A method for utilization of a bunched relativistic electron beam for production of such radiation at submillimeter wavelengths is reported. In particular, the interaction of a bunched beam with the fields propagated by a corrugated cylindrical waveguide structure is being investigated. Design criteria for the waveguide structure have been devised. Cold radio-frequency tests have been made on structures scaled to C-band, and the

results have been compared with theory. A structure scaled to 7.5 mm wavelength has been designed and is being electroformed. (Author)

AD-407 128 Div. 8
(TISTE/JWS) OTS price $3.60

Microwave Lab., Stanford U., Calif.
FOLDOVER IN DIODE-LOADED RESONANT CIRCUITS.
by Robert Edward Tokheim. Aug 62, 31p. 945
Contract AF49 638 415, Proj. 47501
Unclassified report

Descriptors: *Varactor diodes, Mathematical models, Frequency, Inductance, Test equipment (Electronics), Test methods, Calibration, Resonance, Measurement.

Experimental investigation of foldover was made in a medium frequency series resonant circuit using two back-to-back Varicap diodes. Foldover of this nature is a phenomenon of some importance in several practical devices, including bistable switching circuits, the parametron, the parametric limiter, the parametric amplifier and the harmonic generator. The purpose of this study was to determine how well such foldover could be predicted from theory for the series circuit. Theoretical results were based upon precise measurements of the individual circuit components. Very good agreement of theory with experiment was obtained, assuming only the fundamental frequency term in the harmonic balance method of solving the nonlinear differential equation. (Author)

AD-407 134 Div. 8
(TISTE/CRJ) OTS price $6.60

Melpar, Inc., Falls Church, Va.
MOLECULAR CIRCUIT DEVELOPMENT.
Quarterly rept. no. 12, 15 Feb-15 May 63.
15 May 63, 63p.
Contract NOw60 0362
Unclassified report

Descriptors: *Microminiaturization (Electronics), *Molecular electronics, Semiconducting films, Dielectric films, Metal films, Limiters, Capacitors, Neodymium compounds, Oxides, Silicon compounds, Carbides, Boron, Vapor plating, Cadmium compounds, Selenides, Films.

Research and development was continued on materials and techniques suitable for the formation of molecular circuits. Material research concerned semiconductive films of silicon carbide, boron, and cadmium selenide and dielectric films of neodymium oxide. Chemical vapor depositions were successful in producing various types of crystallites and crystalline aggregates of silicon carbide; experiments aimed at obtaining uniform films were continued. Amorphous boron films, deposited by means of electron beam evaporation, proved useful in the study of electron transmission through thin films. This research indicates that amorphous films may possess valuable properties quite distinct from those representative of the crystalline state. An operating clipping circuit based on conduction through a boron film was devised. Investigations of dielectric films were concerned with the characterization of neodymium oxide. Deposition procedures were carefully investigated, and electrical properties evaluated over a wide temperature range. This material shows excellent capabilities for use as a high temperature dielectric. Work on field effect devices continued. Cadmium selenide remains the preferred material for the semiconductor film. The application of a field effect device in a current limiter circuit was studied. (Author)

AD-407 172 Div. 8
(TISTE/CAM) OTS price $3.60

Cooley Electronics Lab., U. of Michigan, Ann Arbor.
STUDY OF PHASE-SHIFT AMPLIFIER TECHNIQUES.
Quarterly progress rept. no. 1, 1 Oct-31 Dec 62,
by D. K. Adams. Feb 63, 30p. 5407 1P
Contract DA36 039AMC00059, Task 2Z44 031 17
Unclassified report

Descriptors: *Parametric amplifiers, Radio-frequency power, Varactor diodes, Ferrites, Transmission lines, Gain (Electronics), Pumping (Electronics), Phase modulation, Oscillations, Effectiveness, Waveguide circulators, Magnetic cores, Phase shifters.

Progress was made in studying simple-varactor, multiple-varactor and ferrite-core phase-shift amplifiers. A single-varactor amplifier was built in an optimum structure. The latter operates in the reflection mode with a circulator. The principle weakness of this structure was the diode detector, so considerable study has been made of this detector. Efficiencies in excess of 50 percent have now been measured. Study was made of a transmission line periodically loaded with varactors to see what benefits this technique will provide. A suitable structure was designed and is being tested. Also described are ferrite core techniques, which are being used to investigate phase-shift amplifiers with multiple pumping. A related effect, employing subharmonic oscillations to increase gain, is also discussed. (Author)

AD-407 184 Div. 8, 15
(TISTE/PAR) OTS price $12.50

Electronic Communications, Inc., Timonium, Md.
PSEUDO RANDOM ARRAY INVESTIGATION.
Final rept.,
by J. W. Sherman and M. I. Skolnik. 12 Mar 63,
165p.
Contract AF30 602 2626, Proj. 4506, Task 450604
RADC TDR63 127 Unclassified report

Descriptors: *Coupled antennas, *Antenna configurations, Statistical analysis, Taylor's series, Programming (Computers), Digital computers, Beams (Electromagnetic), Antenna simulators, Statistical functions, Test equipment (Electronics), Test methods, Tests, Simultaneous equations, Simulation, Least squares method, Measurements, Mathematical analysis, Antenna radiation patterns, Design.

This final report describes an investigation of thinned array antennas with unequally spaced elements. Several approaches to array design have been explored and guide lines established for designing arrays. The design techniques reported here include statistically designed density-tapered arrays, ring arrays, and the application of dynamic programming to array theory. The statistical analysis of arrays, the investigation of arrays from an energy concept and number theory have been used to predict average and peak sidelobe levels of antenna arrays in which elements have been removed. The techniques of thinning arrays 50, 70, and 90 percent have been verified by pattern measurements of several model antennas. (Author)

AD-407 186 Div. 8
(TISTP/JW) OTS price $2.60

Hughes Aircraft Co., Culver City, Calif.
A WAVEGUIDE SLOT SWITCHING TECHNIQUE,
by F. J. Goebels, Jr. and C. H. Nonnemaker, Jr.
Apr 63, 24p. SR5
Contract AF19 604 8386, Proj. 4600, Task 460001
AFCRL 63 138
Unclassified report

Descriptors: *Switching circuits, Waveguide switches, Electronic equipment, Phase shifters X-band.

A series of experiments is described on a novel technique which permits a slot radiator in a waveguide to switch its radiation on and off by means of a compact circuit located at the plane of the slow and within the wall thickness of the waveguide feed line. As described in this report, the switching technique is applied to an end-plate series slot. It is electronically operated by means of a d.c. biased varactor diode. As a reference, the switch characteristics when operated by a mechanical tuning plunger are also given. An analytical description of the technique is also included. The experiments were conducted at S-band and at X-band. The S-band model when operated mechanically provided a slot switching ratio of 38 db and when operated electronically gave a ratio of 35.6 db. Similar operation with an X-band model yielded 50 db and 16.1 db, respectively. These results were obtained at the original resonant frequency of the slot, i. e., the presence of the switching circuit did not change the slot resonant frequency. Such electronically controllable slots hold promise for increasing the versatility of waveguide slot arrays. They may also find application in electronically controlled digital phase shifters. (Author)

AD-407 199 Div. 8
(TISTE/CAM) OTS price $2.60

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
INVESTIGATION OF THE EFFECTS OF DRIVING THE MIDDLE CAVITY OF A THREE-CAVITY KLYSTRON.
Interim rept.,
by D. Reynolds. 15 Oct 62, 21p. RR EE544
Contract AF30 602 2573
Unclassified report

Report on Linear Beam Microwave Tubes.

Descriptors: *Klystrons, Electron beams, Theory, Space charges, Ballistics, Radiofrequency power, Traveling wave tubes, Partial differential equations, Electron density, Integration, Motion, Cavity resonators.

An experimental and theoretical investigation is described of the effects of driving the middle cavity of a three-cavity klystron. It indicates that drive power levels within a few decibels of the power output of the tube increase the total power output or efficiency no more than proper tuning of the middle cavity. Included are preliminary results of a theoretical study based upon a combination of space-charge waves and first-order ballistic theory. (Author)

AD-407 268 Div. 8
(TISTP/MFA) OTS price $1.60

Cornell U., School of Electrical Engineering, Ithaca, N. Y.
ION EFFECTS IN A BRILLOUIN BEAM,
by A. S. Gilmour, Jr. and D. D. Hallock.
20 Oct 62, 16p. RR EE545; TR22
Contract AF30 602 2573
Unclassified report

Report on Linear Beam Microwave Tubes.

Descriptors: *Electron beams, *Ions, Instrumentation, Electron guns, Gases, Oscilloscopes, Recording systems, Gas ionization, Electron density, Cathodes (Electron tubes), Vacuum seals, Pressure, Space charges, Brillouin zones, Measurement.

The effects are described of ion neutralization of the space charge in a Brillouin beam noted while making dc and rf current measurements with an electron beam analyzer. Ion neutralization made the beam behavior depart from the ideal Brillouin behavior, resulting in a difference between theory and experiment. As ion neutralization was reduced, the experimental observations approached the theoretical predictions more closely. Ion neutralization was observed by injecting gas into the beam analyzer, on which the measurements were made, and observing the change in beam shape by measuring the current density at various points in the beam on an oscilloscope and an x-y recorder. The beam shape changed during the cathode pulse, indicating a build-up of ions, the rate of ion formation being a linear function of time during the pulse and varying with pressure. The presence and formation of ions in the beam seemed to increase the degree of nonliminarity of flow. (Author)

AD-407 292 Div. 8, 12
(TISTE/CAM) OTS price $1.10

Aeronutronic, Newport Beach, Calif.
PENETRATION AIDS DEVELOPMENT.
Reliability summary rept. for May 63.
15 Sep 61, 5p.
Contract AF04 694 23
Unclassified report

Descriptors: *Decoys, *Penetration, Re-entry vehicles, Processing, Failure (Mechanics), Processing, Reliability, Guided missile components.

AD-407 304 Div. 8, 5
(TISTP/RLG) OTS price $7.60

Armour Research Foundation, Chicago, Ill.
EVALUATION AND IMPROVEMENT OF RADAR BEACON SYSTEMS.
Quarterly progress rept. no. 3, 1 Dec 62-28 Feb 63,
by J. Feldman, S. Kazel, H. Standley, and P. Toulios. 19 Jan 62, 1v.
Contract DA36 039sc90693, Proj. 3C16 19 001
Unclassified report

Descriptors: *Radar beacons, *Tunnel diodes, Theory, Oscillators, Experimental data, Stability, Coherent radar, Velocity, Probability, Narrowband, Tables, Radar interference, Varactor diodes, Amplifiers, Circuits, Ranges, Signal-to-noise ratio, Bandpass filters, Noise (Radar), Video filters, Sensitivity, Design, C-band.

Theory and experimental results of a varactor-tuned, C-Band tunnel diode oscillator are presented. Work on C-band amplifiers is discussed with experimental results. The dc biasing circuit of a c-band tunnel diode amplifier is analyzed and experimental results are obtained. The effect of instability in the biasing circuit is also discussed. The fundamental limitations on the range and accuracy of co-

herent pulsed radar-beacon systems are analyzed. Specifications and design objectives for a coherent beacon are presented. (Author)

AD-407 318 Div. 8
(TISTE/JBM) OTS price $1.60

Keystone Electronics Co., Newark, N. J.
CRYSTAL UNIT CR-(XM-28)/U.
Quarterly progress rept., 1 July-30 Sep 62,
by James M. Ronan. 30 Sep 62, 12p.
Contract DA36 039sc81275
Unclassified report

Descriptors: *Frequency stabilizers, Crystal holders, Glass seals, Cleaning, Metals, Manufacturing methods, Production, Crystals.

Efforts were continued on the manufacture of crystal unit CR-(XM-28). Attempts to obtain consistently satisfactory seals of the HC-27/U type holder were unsuccessful. A design for a new holding fixture is shown, and a commercially available sealing machine is reported. Results indicate that the unglazed base is superior to the glazed in obtaining good seals of the glass parts. A method of cleaning Kovar is reported on, as well as a satisfactory Pyroceram mixture. (Author)

AD-407 324 Div. 8
(TISTE/JWS) OTS price $4.60

Watkins-Johnson Co., Palo Alto, Calif.
APPLIED RESEARCH ON A HIGH-POWER MILLIMETER-WAVE GENERATOR.
Interim engineering rept. no. 8, 1 Mar-31 May 63,
by M. V. Purnell. 31 May 63, 36p.
Contract AF33 616 8369, Task 415603
Unclassified report

Descriptors: *Backward wave oscillators, Millimeter waves, Radio frequency power, Magnetic fields, Waveguides, Measurement, Tungsten, Calorimeter, Calibration, Electron guns, Electron beams, Extremely high frequency.

Efforts were continued to demonstrate the feasibility of generating very high power, specifically 100 kw peak and 1000 watt average at 100 Gc by means of an O-type backward-wave oscillator operating at very high voltage. During the eighth quarter, experimental tube No. 3 was completed and some test data has been obtained. Testing of tube No. 3 will be continued during the next quarter of the program. Peak and average power have been measured at 107 kw and 215 watts respectively. Very recent results have shown average power of over 300 watts. The 435-1C gun is used in tube No. 3. Test results show improved focusing with a reduced magnetic field as compared with guns used in previous tubes. The rf output power is terminated in helical stainless steel waveguides. These rf loads are water cooled for use with the calorimeter for average power measurement. A tungsten insert was used to collimate the electron beam at the anode to prevent peak heating damage to the disk loaded waveguide circuit. (Author)

AD-407 373 Div. 8
(TISTE/JBM) OTS price $2.60

VARO, Inc., Garland, Tex.
ZERO FIELD-DISTORTION MICROWAVE PROBES,
by Winfield W. Salisbury. 8 Feb 63, 23p.
Contract AF30 602 2336, Proj. 5561, Task 556103
RADC TDR63 92 Unclassified report

Descriptors: *Probes (Electromagnetic) *Electromagnetic fields, *Measuring devices (Electrical and electronic), Plasma physics, Scattering, Electrical impedance, Bandwidth, Magnetic fields, Electric fields, Design, Transmission lines, Attenuation, Configuration, Thermocouples, Electric currents, Integrals, Standing-wave ratios, Calibration, Equations, Microwaves, Distortion, Temperature, Microwave equipment, Measurement.

Efforts concerned measuring microwave fields. At least four types of probes are required to probe the high intensity microwave fields and the accompanying plasmas. The disturbance of the plasma and the fields due to the volume displacement of the physical presence of the probe and stem, and due to the small amount of energy extraction necessary for the probe readings is unavoidable, but scattering due to the antenna-like configuration of the probe stem can be minimized to be negligible. The stems which support the probes and which contain the transmission line connections should be as small as mechanical and electrical designs will readily permit, and must be designed in a special way in order to minimize scattering of the microwaves. It is necessary to design a structure upon the surface of the probe stems which has a high wave impedance for the microwaves, compared to the impedance of space. This permits the currents excited in the probe stems by the microwaves to be held to a minimum so that their reradiation scattering will not interfere with the probe measurements or the general course of the experiment. Probes have so far been designed and tested which are essentially responsive to microwave magnetic field, microwave electric field, microwave power, as a function of wave direction, as in a directional coupler, and temperature of a small test object exposed to the microwave and to any plasma which may exist in its vicinity.

AD-407 379 Div. 8, 5, 30
(TISTE/JBM) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
TRENDS IN MISSILE AND SPACE RADIO TELEMETRY,
by Joachim W. Muehlner. 1962, 45p. LMSC5 10 62 28
Unclassified report

Descriptors: *Telemeter systems, *Space flight, *Modulation, Radio communications systems, Multiplex, Bandwidth, Standardization, Digital systems, Coding, Guided missiles, Modulations, Frequency modulations, Pulse modulations, Time, Phase modulation, Communication theory, Telemeter systems.

A discussion is presented of telemetry systems and requirements for missile and space applications. Various modulation methods and concepts are presented. For the majority of data connected with large-scale rocket and space missions, the PAM/PCM-FM system is well suited because of its adaptability, economy of bandwidth and power, and ability to handle some high-accuracy data. If the bulk of the data to be transmitted demands high accuracy and/or the data format must be compatible with computing equipment aboard the space vehicle, PCM-FM is most appropriate. In any case it becomes progressively more important to combat the flood of data descending on us from outer space. This can best be achieved by information bandwidth compression schemes based on elimination of redundancy. Techniques such as are presently under development lead to compression factors of the order of 30, referenced to the indiscriminate data-transmission practices of today. (Author)

ELECTRONICS AND ELECTRONIC EQUIPMENT - Division 8

AD-407 381 Div. 8
(TISTE/JBM) OTS price $1.10

General Electric Co., Utica, N. Y.
QRC-139A AEROSPACE GROUND EQUIPMENT (AGE).
Monthly progress rept. no. 15, 10 May-13 June 63.
17 June 63, 5p.
Contract AF33 604 39443
Unclassified report

Descriptors: *Frequency converters, *Frequency analyzers, Radar jamming, Radar transmitters, Broadband, S band, L band, Moistureproofing, Radiofrequency spectroscopy, Microwave spectroscopy, Spectrum analyzers, Test sets, Modification kits, Sealing compounds, Silicon plastics, Varnishes, Tests.

AD-407 416 Div. 8, 26
(TISTE/OHD) OTS price $5.60

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES TO INCREASE TRANSISTOR RELIABILITY.
Quarterly progress rept. no. 3, 1 Nov 62-31 Jan 63.
31 Jan 63, 55p.
Contract DA36 039sc86730
Unclassified report

Descriptors: *Transistors, *Manufacturing methods, Epitaxial growth, Diffusion, Photoengraving, Coatings, Fixed contacts, Cleaning, Surface properties, Welding, Evaporation.

The major area of engineering activity was on the following process steps: (1) epitaxial germanium control; (2) surface preparation for growth; (3) cleaning techniques to obtain optimum surface conditions; (4) welding techniques for encapsulation; (5) evaporation control; (6) mesa and dice cutting; (7) piece part incoming inspection; (8) photo masking; (9) lead attachment; and (10) contact materials. (Author)

AD-407 424 Div. 8
(TISTP/MH) OTS price $1.60

Antenna Lab., Ohio State U., Research Foundation, Columbus.
BACK-SCATTERING OF CIRCULARLY POLARIZED WAVES FROM SLIGHTLY ROUGH SURFACES,
by J. L. George. 30 Apr 61, 11p. Rept. 1179 1
Contract N2811
Unclassified report

Descriptors: *Electromagnetic waves, Polarization, Surface properties, Surfaces, Lunar environment, Moon, Radar, Electric fields, Dielectric properties, Electrical conductance, Scattering.

The analysis of the interaction of electromagnetic waves with a slightly rough surface has previously been carried out for the case of horizontal and vertical polarization. The purpose of this paper is to extend these results to the case of circular polarization, and to attempt to determine the radar back-scattering coefficient of the Moon by this method. (Author)

AD-407 427 Div. 8, 15
(TISTP/MH) OTS price $5.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
SPATIAL FILTERING,
by Frank Ayres. 15 May 61, 47p. Rept. no. 1222-2
Contract AF33 616 7843, Proj. 1 620 4144, Task 50682
Unclassified report

Report on Guidance and Sensing Techniques for Advanced Vehicles.

Descriptors: *Filters, Signals, Integral transforms, Functions, Frequency, Images, Statistical processes, Matrix algebra, Bandpass filters, Lenses, Scanning, Networks.

The mathematical relationships for filtering in a space domain are developed in a general analogy with temporal filtering. Cases in which the elements of the filtering system are continuous or discrete are discussed. General examples of spatial filtering and the realization of such filters are shown. (Author)

AD-407 449 Div. 8
(TISTE/PAR) OTS price $11.00

American Electronic Labs., Inc., Colmar, Pa.
INVESTIGATION OF TECHNIQUES FOR CONTROL OF INTERFERENCE GENERATED BY SWITCHING DEVICES,
by E. Katz and F. Messner. Jan 63, 1v. 61055F
Contract AF33 657 7268, Proj. 4357, Task 435712
ASD TDR63 369
Unclassified report

Descriptors: *Electronic switches, *Switching circuits, *Suppressors, Avalanche diodes, Negative resistance circuits, Low-pass filters, Semiconductor devices, Diodes (Semiconductors), Transistors, Capacitors, Electric filters, Resistors, Voltage regulators, Electrical properties, Filters (Electromagnetic wave), Fourier analysis, Coupling circuits, Attenuation, Tests, Fuses, Clipper circuits, Gates (Circuits), Test equipment (Electronic), Test methods, Interference, Transients, Radiofrequency interference.

The objective of this program was to investigate the basic characteristics of electronic circuitry, components, and design practices that contribute to the creation of interference in present and proposed switching devices, and to determine techniques required for effective reduction and control of this interference. Particular emphasis is placed on solid state devices, both as sources of interference and as suppression techniques. In addition to presenting experimental data and new interference reduction concepts as developed under this program, this report provides a general dissertation on the generation and transmission of switching device interference and on techniques for suppression of this type of interference. Major coverage has been given to the area of filter techniques, including the development and comprehensive analysis of active filter networks. Use of passive suppressor elements to minimize undesired transients is considered, and a group of circuit techniques to protect against DC line transients is presented. (Author)

AD-407 451 Div. 8, 15
(TISTP/RLG) OTS price $1.60

Columbia U., New York.
ON A TELEPHONE TRAFFIC SYSTEM WITH SEVERAL KINDS OF SERVICE DISTRIBUTIONS,
by Joseph L. Gastwirth. 21 May 63, 17p.
CU37 63 Nonr266 59MS
Contract Nonr 266 59, Proj NR042 205
Unclassified report

Descriptors: *Telephone communications systems, Communication theory, Queueing theory, Sequential analysis, Statistical functions, Probability, Algebras, Measure theory, Binomials, Statistical processes, Distribution theory.

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-407 468 Div. 8
(TISTE/PAR) OTS price $7.60

Southwest Research Inst., San Antonio, Tex.
PERFORMANCE CHARACTERISTICS OF A SPACED LOOP ANTENNA FORMED BY TWO ARBITRARILY ORIENTED PARALLEL LOOPS.
Task summary rept. no. 13 and Interim development rept., 1 Jan 63-1 Apr 63,
by Douglas N. Travers. 1 Apr 63, 66p.
Contract NObsr89167, Proj. SF0010801, Task 9258
Unclassified report

Descriptors: *Loop antennas, *Antenna radiation patterns, Antenna configurations, Coupled antennas, Signal-to-noise ratio, Electric fields, Magnetic fields, Gain, Ship antennas, Dipole antennas, Theory, Transistor amplifier, Electrical impedance, Antennas, Antenna lobes, Polarization, Mathematical analysis.

This report was prepared in order to make available in a single reference a complete listing of the important performance characteristics of the spaced loop antenna. The exact field equations of a general spaced loop are derived and used as a basis for all other performance characteristics. The coaxial spaced loop and coplanar spaced loop are treated as special cases of the general analysis. Any two loop spaced loop operating in the quadrupole mode may be treated as a special case. Field patterns are derived for near and far fields, for azimuth and elevation planes, and for both vertical and horizontal polarization, for any spaced loop. These results are plotted to show that certain spaced loops have pattern variations as a function of distance to the source. The field equations are then used to compute the radiation resistance, the effective height, effective area, gain, signal-to-noise ratio, noise figure, minimum observable field strength and impedance. Other characteristics including reradiation error reduction, pattern variations with source distance, construction difficulties and pattern distortion sources are reviewed. The report begins with very general concepts concerning a spaced loop, all formulas are explained so that practical conclusions may be drawn. (Author)

AD-407 469 Div. 8, 25
(TISTP/RD) OTS price $3.60

Braddock, Dunn, and McDonald, Inc., El Paso, Tex.
NANOSECOND PULSE BREAKDOWN STUDY,
by Daniel F. McDonald and Manfred Walter.
15 Apr 63, 37p. BDM R BQ101
Contract AF30 602 2781
RADC TDR63 201 Unclassified report

Descriptors: *Microwave frequency, *Electric discharges, Waveguides, Electromagnetic pulses, Electron density, Antennas.

The theory and most recent experimental work on breakdown under high-power microwave pulses are analyzed. Recommendations are made for further theoretical and experimental investigations to extend this work into the nanosecond region. The feasibility of spectroscopic techniques in the study of discharge growth is considered. It is shown that light emitted during discharge build-up may be of sufficient intensity to allow photometric measurements of the growth rate. (Author)

AD-407 516 Div. 8, 26
(TISTE/JWS) OTS price $7.60

Dearborn Electronic Labs., Inc., Orlando, Fla.
MANUFACTURING METHODS FOR METALLIZED TEFLON CAPACITORS (SUBMINIATURE 200 C).
Final rept., Mar 59-Apr 63,
by Douglas H. Smith. Apr 63, 25p.
Contract AF33 600 38431, Proj. 7 604
ASD TDR63 308 Unclassified report

Report on Metallized Teflon Capacitor.

Descriptors: *Fixed capacitors, Aluminum, Metal films, Halocarbon plastics, Subminiature electronic equipment, Temperature, Life expectancy, Environmental tests, High altitude, Electric potential, Manufacturing methods.

Metal-encased, tubular, hermetically sealed, metallized teflon capacitors which reduce the volume per microfarad of capacitance up to one-fourth that of conventional teflon dielectric foil capacitors can be fabricated on a production basis. These capacitors are designed to operate over a temperature range of -65 C to 200 C and are capable of withstanding the severe environmental conditions. Available winding machines were modified for the winding of thin teflon film because of the films tendency to distort in both width and thickness when not held under constant or controlled tension. These modifications were all directed toward the exertion of constant tension on the winding material thereby alleviating major winding problems. The composite-type construction employing one aluminum metallized teflon electrode and one standard aluminum foil electrode was used in the construction of the capacitors. Lead attachments were made by spraying the ends of the capacitor with a high temperature aluminum solder. The capacitors fabricated using multiple layers of material were satisfactory upon completion of load life testing for a period of 1000 hrs with a 140% of rated voltage at a temperature of 200 C. However, the capacitors fabricated with single layer material failed the 1000-hr load life test because numerous momentary breakdowns weakened or destroyed the connections between the sprayed and connections and electrodes.

AD-407 599 Div. 8
(TISTE/JBM) OTS price $1.60

Microwave Associates, Inc., Burlington, Mass.
PEM-SOLID STATE MICROWAVE TR-ATR SWITCH.
Quarterly technical rept. no. 3, 18 Oct 62-18 Jan 63,
by Henry W. Mooncai. 18 Jan 63, 17p.
Contract DA36 039sc86718
Unclassified report

Descriptors: *Radar duplexers, *Diodes (Semiconductors), *Electronic switches, X band, Mechanical properties, Design, Test methods, Tests, Varactor diodes, Life expectancy, Production, Waveguide switches, Aluminum alloys, Tuned circuits, Standing-wave ratios, Microwave equipment.

Efforts were continued on the production of solid-state, X-band microwave TR-ATR switches for use in a balanced duplexer. An improved mechanical TR-ATR switch design was established. Details of this design are described. In addition, diode pre-test methods are described along with tuning and testing procedures of the final assembly. Also presented are performance characteristics of a typical TR-ATR switch which was assembled and tested by use of the above-mentioned methods. In addition preliminary life test data secured as of date is also included. (Author)

AD-407 615 Div. 8, 26
(TISTE/JBM) OTS price $3.60

Motorola, Inc., Phoenix, Ariz.
PRODUCTION ENGINEERING MEASURE 400 Mc, 300 mW POWER TRANSISTOR.
Quarterly rept. no. 7, 23 Dec 62-23 Mar 63,
by R. A. Jacobs and John C. Howe. 23 Mar 63, 1v.
Contract DA36 039sc85975
Unclassified report

Report on Step 1

Descriptors: *Transistors, Ultrahigh frequency, Production, Manufacturing methods, Vibration, Acceleration, Shock resistance, Tests, Aluminum, Power, Environmental tests, Specifications, Germanium.

Efforts were continued on the production of a 400 Mc, germanium power transistor. There were no changes in the device mechanical design, device electrical design, or process technology. The second group of pre-production samples successfully passed the Group B, Subgroups 2 and 5 environmental tests. A group of devices with an all-aluminum lead bonding system were subject, along with a control group of devices with a gold-aluminum system, to the vibration variable frequency, constant acceleration, and shock tests. There were no failures on any of the tests. (Author)

AD-407 672 Div. 8
(TISTP/FEM) OTS price $1.60

Polytechnic Inst. of Brooklyn, N. Y.
ACTIVE AND TIME VARYING SYSTEMS AND LINEAR NETWORKS.
Final rept.
1962, 1v. Rept. no. PIBMRI 1088 62
Contract AF18 603 105
AFOSR 4757 Unclassified report

Descriptors: *Feedback, *Adaptive control systems, *Linear systems, Sensitivity, Time, Differential equations, Abstracts, Control systems, Circuits, Periodic variations, Analysis, Synthesis, Oscillation, Stability, Networks.

AD-407 675 Div. 8, 32
(TISTE/JBM) OTS price $1.60

Aerospace Information Div., Washington, D. C.
ASYNCHRONOUS ACTIONS. ANNOTATED BIBLIOGRAPHY.
Report for Jan 58-Dec 62.
14 June 63, 10p. Rept. no. B63 84
Task 15
Unclassified report

Descriptors: *Bibliographies, *Oscillators, Synchronizing (Electronics), Noise (Radio), Harmonic oscillators, Equations, Theory.

9. FLUID MECHANICS

AD-407 001 Div. 9, 25
(TISTP/MFA) OTS price $2.60

Wyandotte Chemicals Corp., Mich.
DEPARTURES FROM LTE IN EMISSION AND ABSORPTION BY CONTINUOUS ENERGY STATES. I. RADIATIVE EQUILIBRIUM,
by Ludwig Oster. Mar 63, 18p.
Contract AF33 657 7271, Proj. 7073, Task 707301
ARL 63 63 Unclassified report

Interim technical report on Research on Plasma Dynamics.

Descriptors: *Thermodynamics, *Masers, Distribution theory, Cerenkov radiation, Functional analysis, Particle spectra, Plasma physics, Thermal radiation, Emissivity, Absorption.

A general formulation of the theory of departures from LTE in free-free emissions and absorption is developed. The problem is treated subject to the restrictions to steady state and radiative interactions. Particle distribution function and radiation field are studies separately, special attention is given to the transfer problem. The possibility of negative absorption (maser action) is discussed. (Author)

AD-407 051 Div. 9, 1
(TISTA/LSK) OTS price $4.60

Instituto Tecnologico De Aeronautica, Sao Paulo, Brazil.
EXPERIMENTS WITH AN EXTERNAL JET FLAP,
by M. J. Krieger. 1963, 36p.
Contract AF49 638 583
AFOSR 4730 Unclassified report

Descriptors: *Jet flaps, Aerodynamic characteristics, Wind tunnel models, Air foils, Flaps, Aerodynamic configurations, Model tests.

A blower-type wind tunnel study was made of several external-jet-flap configurations were tested between end plates. Comparison is also made with a trailing edge jet flap tested under the same conditions. Tests were made at a Reynolds number of 1.7 x 10 to the 5th power and at jet momentum coefficients up to 2.616, through a range of angles of attack from 0 to 35 degrees. (Author)

AD-407 052 Div. 9, 25
(TISTP/MH) OTS price $4.60

Princeton U., N. J.
AN EXPERIMENTAL INVESTIGATION OF LAMINAR HYPERSONIC CAVITY FLOWS. PART I: PRESSURE MEASUREMENTS,
by K. M. Nicoll. May 63, 40p.
Contract AF33 616 7629, Proj. 7064, Task 7064 01
ARL 63 73 Unclassified report

Descriptors: *Conical bodies, Measurement, Distribution, Recovery, Heat transfer, Distribution, Surfaces, Surface properties, Gas flow, Laminar flow, Laminar boundary layer, Hypersonic flow, Pressure.

An experimental investigation has been made of the pressure distributions on a set of cone-models incorporating annular cavities. This study is the first part of a program which includes measurements of recovery factor and heat-transfer distributions. The cone-surface Mach number was 6.5, and all cavity flows were "open". The results indicate that a regime of laminar, open cavity flow exists at hypersonic Mach number which is characterized by the property that the cavity floor pressure is virtually constant. Recompression is confined to the last 10% of the cavity near the reattachment point. (Author)

AD-407 135 Div. 9, 25
(TISTP/MH) OTS price $4.60

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
SIMILARITY PARAMETERS FOR RADIATIVE ENERGY

TRANSFER IN ISOTHERMAL AND NON-ISOTHERMAL GAS MIXTURES,
by S. S. Penner, M. Thomas and G. Adomeit.
Dec 62, 45p. TR1
Grant AFOSR7163

Unclassified report

Descriptors: *Gases, Transport properties, Scale, Gas flow, Fluid mechanics, Spectroscopy, Models, Temperature, Doppler effect, Energy conversion.

The similarity groups for multicomponent, reacting gas mixtures with radiative energy transport are derived. The resulting relations are used to consider the feasibility of scaling for flow processes with radiative energy transport under highly simplified conditions. The scaling parameters are derived for radiant energy emission from isobaric and isothermal gases for arbitrary opacities and various spectral line and molecular band models. Scaling parameters for radiant energy emission from isobaric but non-isothermal systems are discussed for arbitrary opacities and various spectral line and molecular band models under the restrictions imposed on the allowed temperature profiles for dispersion and Doppler lines by the Eddington-Barbier approximation. Finally, the radiative scaling properties for representative temperature profiles are considered for both collision-broadened and Doppler-broadened line profiles on the basis of exact numerical calculations that were performed for a rotational spectral line belonging to a molecular vibration-rotation band. (Author)

AD-407 148 Div. 9
(TISTP/JEA) OTS price $8.60

Therm, Inc., Ithaca, N. Y.
THE AERODYNAMIC LOADING ON STREAMLINED DUCTED BODIES,
by Gary R. Hough. Dec 62, 89p. TR625
Contract Nonr285900

Unclassified report

Descriptors: *Aerodynamic loading, *Ducted bodies, Mathematical models, Linear systems, Pressure, Axially symmetric flow, Distribution, Ducts, Numerical analysis, Vortices, Velocity, Pitch (Motion), Reduction, Matrix algebra.

A simple method for the rapid determination of the linearized surface pressure distribution on streamlined ducted bodies in axisymmetric flow is developed using conventional singularity distributions. The final form of the pressure coefficient is expressed directly as a single matrix operation on the duct sectional properties and tables of the necessary matrix coefficients are given. Several numerical examples are worked out and compared with the results of previous theoretical and experimental investigations. (Author)

AD-407 167 Div. 9
(TISTP/RLG) OTS price $1.60

Ecole Normale Superieure (France).
ON THE THEORY OF CLASSICAL FLUIDS. III,
by Loup Verlet. Mar 63, 15p. TN9
Grant AF EOAR 63 47
AFOSR 4767

Unclassified report

Descriptors: *Fluids, *Mathematical models, Integral equations, Potential theory, Series, Differential equations, Temperature, N body problem, Statistical functions, Taylor's series, Equations, Gases, Argon, Theory, Numerical analysis.

It is shown that Percus' method can be used to write down explicitly integral equations for the two-body correlation function which generalizes the PY and HNC equation. A first test of the fitness of such equations was given in the case of the hard cube gas. Further information will be provided in a future paper where the equations given in the present paper will be applied to the case of the lattice gas. (Author)

AD-407 183 Div. 9, 12
(TISTA/GEC) OTS price $10.50

Alpha Research, Inc., Santa Barbara, Calif.
THE DYNAMICS AND AERODYNAMICS OF SELF-SUSTAINED LARGE ANGLE OF ATTACK BODY SPINNING MOTIONS. Final rept.,
by James E. Brunk. Feb 63, 1v. 63 1158 1
Contract AF49 638 1158, Proj. 7856, Task 7856 01
AFOSR 4596

Unclassified report

Subcontract to Electronic Communications, Inc., Santa Barbara, Calif.

Descriptors: *Booster rockets, *Guided missiles, *Spin stabilized ammunition, Angle of attack, Drag, Guided missile trajectories, Atmosphere entry, Low altitude, Cylindrical bodies, Mathematical analysis, Theory, Pressure, Stability, Equations, Magnus force, Deceleration, Rotation, Spin, Aerodynamic characteristics, Recovery.

Several aerodynamic mechanisms, which will sustain large angle of attack body autorotative motions, are examined. It is shown that autorotative motion can result in a very large drag force, which may significantly aid missile and booster recovery. A linear theory, which satisfactorily predicts the near-steady-state autorotative spin characteristics of quasi-axi-symmetric bodies, is presented. The initiation of body autorotative motions under both low altitude and re-entry environments is investigated by a special six-degrees-of-freedom trajectory program. The aerodynamic characteristics of cylinder-shaped bodies at angles of attack near 90 degrees are discussed. (Author)

AD-407 294 Div. 9, 7
(TISTP/MFA) OTS price $3.60

AVCO Everett Research Lab., Everett, Mass.
CURRENT SPEED IN A MAGNETIC ANNULAR SHOCK TUBE,
by James Keck. May 63, 32p. RR152
Contract AF49 638 659

Unclassified report

Descriptors: *Shock tubes, *Plasma physics, Measurement, Magnetic fields, Light, Photons, Drag, Ablation, Transport properties, Gases, Dynamics, Pressure, Ultraviolet radiation, Electric currents, Velocity, Gas discharges, Gas ionization.

A parametric study of the speeds of the current sheet and center-of-gravity of current in a magnetic annular shock tube has been completed. The parameters varied include: (1) the drive current, (2) the polarity of the inner electrodes, (3) the gas pressure, (4) the nature of the gas, (5) the radius of the inner electrode, and (6) the material of the inner electrode. The most interesting result of the investigation was the observation of limiting speeds for the current sheet and center-of-gravity of current of approximately 8 cm/mus and 3 cm/mus, respectively These speeds were not exceeded even under conditions where the magnetic pressure exceeded the dynamic pressure by a factor of 10. The most probable explanation of the limiting speed is that it is due to the inertial drag of material ablated from the insulator at the driver end of the shock tube. (Author)

AD-407 296 Div. 9, 25
(TISTP/MFA) OTS price $2.60

Oklahoma State U. Research Foundation, Stillwater.
SHEAR WAVE PROPAGATION IN A BIREFRINGENT VISCO-ELASTIC MEDIUM,
by George B. Thurston and John L. Schrag.
June 63, 20p.
Contract Nonr259503, Proj. NR385 545
Unclassified report

Descriptors: *Viscoelasticity, Optical properties, Propagation, Photomultipliers, Shear stresses, Wave transmission, Light, Polarization, Mechanical properties, Optical equipment, Measurement, Refractive index.

A theoretical and experimental study is described for the optical birefringence associated with the propagation of a plane shear wave in a viscoelastic medium. The shear wave propagation is characterized by a complex propagation constant from which the complex coefficient of shear viscosity of the medium may be derived. The optical birefringence is related to the mechanical action of the shear wave by a complex mechano-optic coefficient. In the experiment the birefringence due to the shear wave is analyzed by transmitting circularly polarized light through the material at right angles to the direction of shear wave propagation and to the direction of particle displacement. The modified circularly polarized light is then analyzed by a plane analyzer and a photomultiplier detector. The mechanical and mechano-optic constants for the medium are determined for an aqueous milling yellow solution and for a polystyrene solution and are compared with independent determinations of these same factors from other experiments. (Author)

AD-407 472 Div. 9
(TISTP/MH) OTS price $3.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
MEASUREMENT OF HEAT TRANSFER ON A FLAT PLATE-STEP MODEL AT MACH 14 (TASK 3.4--SHOCK TUNNEL EXPERIMENTS--REST PROJECT),
by V. A. Sandborn and K. Heron. 26 June 63, 34p.
TM RAD TM63 40
Contract AF04 694 239
Unclassified report

Descriptors: *Flat plate models, *Hypersonic flow, Hypersonic characteristics, Fluid flow, Measurement, Shock tubes, Hypersonic wind tunnels, Boundary layer, Wake, Models, Calorimeters, Distribution, Shock tubes, Heat transfer, Measurement.

An experimental study of the separation of a hypersonic boundary layer ahead of a step on a flat plate is reported. The measurements were made in a Mach 14 shock tunnel. The flow field is visually observed with a glow probe. Local heat transfer distribution along the flat plate and up the face of the step is reported. The detailed heat transfer distribution shows a local increase in heat transfer associated with the separation shock, a decrease in heat transfer just downstream of the separation point, and a second increase in heat transfer as the step is approached. Directly at the corner between the flat plate and the step, the heat transfer reverses direction and is from the heat gage to the stream. No explanation was found for the corner effect. Preliminary measurements of the local heat transfer distribution across the separation layer with hot wire calorimeters are also reported. (Author)

AD-407 504 Div. 9
(TISTA/GEC) OTS price $14.00

Cornell U., Graduate School of Aerospace Engineering, Ithaca, N. Y.
A THEORY FOR UNSTEADY MOTIONS OF JET-FLAPPED THIN AIRFOILS,
by J. C. Erickson, Jr. Sep 62, 200p.
Contract AF49 638 544
Unclassified report

Descriptors: *Supersonic air foils, *Jet flaps, Theory, Oscillations, Gas flow, Turbulence, Incompressible flow, Equations, Partial differential equations, Aerodynamic characteristics, Pitch (Motion), Deflection, Integral equations, Mathematical analysis, Mathematical models.

A linearized model for the incompressible, inviscid, irrotational, and unsteady flow about a thin airfoil with jet-flap is formulated. The unsteady problems considered are the transient and oscillatory deflection of the jet, plunging and pitching of the airfoil, deflection of a blown-flap, and also the penetration of a sharp-edged gust. Justification is given for representation of the jet, in the limit of high speed, small thickness, and constant momentum-flux strength, by a vortex sheet, across which there is a pressure difference proportional to the momentum-flux strength and inversely proportional to the local radius of curvature of the jet. The dynamic and kinematic interaction of the main stream with the vortex sheets representing the airfoil and jet are shown to be described by a coupled set of equations consisting of a third-order partial differential equation and a singular integral equation, along with appropriate boundary conditions. The properties of these equations and their relationship to classical unsteady thin-airfoil theory and steady jet-flap theory are discussed. (Author)

AD-407 505 Div. 9
(TISTP/MH) OTS price $19.75

Columbia U., New York.
AN EXPERIMENTAL STUDY OF HEAT TRANSFER AT HIGH TEMPERATURE DIFFERENCES IN TURBULENT AIR FLOW BETWEEN A ROTATING CYLINDER AND A STATIONARY CONCENTRIC OUTER CYLINDER.
Final rept.,
by G. S. Longobardo and H. G. Elrod. Aug 62, 327p.
Contract AF49 638 1001
AFOSR 3207
Unclassified report

Descriptors: *Heat transfer, Cylindrical bodies, Rotation, Surface temperatures, Velocity, Temperatures, Distribution, Anemometers, Gas flow, Turbulence, Fluid flow, Convection.

A study was made of convective heat transfer

between a rotating cylinder and a stationary, concentric outer cylinder for the Taylor number range 2000 to 9000, and for rotor surface temperatures in the range 80 to 430 F. Measurements were made of over-all heat transfer, and velocity and temperature distributions in the gap between the two cylinders. A hot wire anemometer was used to determine whether secondary flows exist in the gap in the Taylor number range of the investigation. (Author)

AD-407 569 Div. 9, 25
(TISTP/RLG) OTS price $1.60

Stanford U., Calif.
THEORETICAL AND EMPIRICAL STUDIES OF THE BASIC STRUCTURE OF TURBULENT SHEAR FLOWS, INCLUDING GENERALIZED THERMOKINETIC APPROACHES.
Final rept.,
by S. J. Kline, W. C. Reynolds, and J. P. Johnston. 15 Nov 62, 11p.
Contract AF49 638 201
AFOSR 4599 Unclassified report

Descriptors: *Turbulent boundary layer, *Fluid flow, Fluid dynamic properties, Diffusers, Stability, Temperature, Fluid mechanics, Pressure, Models, Shear stresses, Theory.

AD-407 583 Div. 9
(TISTP/MH) OTS price $8.60

Naval Ordnance Lab., White Oak, Md.
AN INCREMENTAL HYDROBAROPHONE,
by Edward L. Peters and Charles H. Marshall.
27 Feb 63, 1v.
NOL TR62 174
Unclassified report

Descriptors: *Hydrostatic pressure, *Hydrophones, Bridges, Electrical networks, Hydrostatics, Sensitivity, Hydraulic valves, Acoustic filters, Band-pass filters, Low frequency, Glass textiles, Fluid mechanics, Pressure gages.

A Wien bridge-type hydrobarophone capable of measuring incremental pressure fluctuations as low as 0.10 in. of water in the presence of a static head as high as 300 ft of water is described. A frequency response of 0-200 cps is attainable. Special features include: (1) an incremental pressure sensitivity independent of static head. This is accomplished by pressure equalization through a system of an air-pressure bag and valves; (2) an acoustic filter inserted between the pressure equalization system and the active portion of the hydrobarophone permits pass band operation. The low frequency end of the band can be easily adjusted for any desired period less than an hour; (3) enclosure of the hydrobarophone in a fiberglass container for shielding it from undesirable temperature changes; and (4) an attached temperature indicator, instrumental in obtaining an accurate hydrobarophone. (Author)

AD-407 689 Div. 9, 30
(TISTP/BRW) OTS price $.75

Directorate of Engineering Test, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
CORRELATION OF WIND TUNNEL BLOCKAGE DATA.
Final rept., Sep 61-May 62,
by Paul A. Czysz. Apr 63, 21p.
Proj. 142601, Task 1426
ASD TDR63 230
Unclassified report

Descriptors: *Hypersonic wind tunnels, *Wind tunnel models, Hypersonic flow, Aerodynamic configurations, Blunt bodies, Conical bodies, Flat plate models, Delta wings, Hemispherical shells, Model tests, Interference.

An experimental investigation of the test section flow blockage characteristics was conducted at Mach 4 in the High Temperature Hypersonic Gasdynamics Facility. The models utilized in this program were pointed and blunted cones from 5-degree half angle to 90-degree half angle, flat plates, delta winged shapes, and hemispherical models, some of which were run up to 40-degree angle of attack. Comparison of the data with other facilities resulted in a correlation of the maximum model size compared to the potential flow core size with Mach number and drag coefficient for both open and closed test section configurations for Mach numbers from 1.5 to greater than 10. (Author)

10. FUELS AND COMBUSTION

AD-406 864 Div. 10
(TISTM/EJH) OTS price $36.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MOTOR, JET, AND ROCKET FUELS,
by K. K. Papok and Ye. G. Semenido. 16 Apr 63, 988p.
FTD TT62 1308 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Neftyanoy i Gorno-Toplivnoy Literatury, Moskva, pp. 1-741, 1962.

Descriptors: *Fuels, *Jet engine fuels, *Aviation fuels, *Liquid rocket fuels, Petroleum, Gasoline, Fuel additives, Liquid rocket oxidizers, Combustion, Chemical properties, Monopropellants, Toxicity, Stability, Vaporization, Corrosion, Bibliography, Data.

''Motor and Jet Fuels and Rocket Propellants'' is the fourth completely revised edition of the first volume of the book ''Motor Fuels, Lubricants, and Liquids,'' issued in 1957. It examines in detail the physicochemical and operational properties of aviation, jet, rocket, automotive, diesel, and boiler fuels, as well as the basic problems relating to the qualities and utilization of these fuels in engines and aircraft assemblies and ground machinery. Individual chapters of the book are devoted to the most important problems in the area of fuels - corrosion and scale-formation properties, heat

of combustion, low-temperature properties, tar formation, deposition, etc. This book is intended for engineers and technicians working in areas in which fuels are used, as well as for those people engaged in the operation of various engines and the refining of petroleum. (Author)

AD-406 883 Div. 10
(TISTM/REB) OTS price $7.60

Thiokol Chemical Corp., Elkton, Md.
A RESEARCH STUDY TO ADVANCE THE STATE OF THE ART OF SOLID PROPELLANT GRAIN DESIGN.
Quarterly progress rept. no. 3, 1 Jan-1 Apr 63. 26 Apr 63, 70p. E74 63
Contract AF33 616 6530, Proj. 3059, Task 30531
Unclassified report

Descriptors: *Rocket propellant grains, Design, Heat transfer, Burning rate (Combustion), Stresses, Deformation, Analysis, Computers, Cylindrical bodies, Theory, Geometric forms.

A research study is being conducted to advance the state of the art of solid propellant grain design and consists primarily of theoretical and applied analyses of solid propellant grain designs, considering in particular heat transfer effects, propellant slump, and the effect of strain on burning rate. An analytical study is being undertaken to develop a two-dimensional heat transfer analysis for solid propellant motors subjected to a nonlinear external thermal environment. The application of this analysis to the Advanced Grain Design Computer Program is also being investigated to determine thermal effects upon ballistic characteristics. The programming of the two-dimensional heat transfer analysis was completed, and several test cases were evaluated. A severe stability requirement is imposed on the solution resulting from the consideration of a thin case wall having a relatively higher thermal diffusivity. The effect of strain on the burning rates of several propellants increases as the deviation from incompressible behavior increases. The analysis of propellant slump involved a preliminary analysis of a finite length, cylindrical grain having a spherical head end and under acceleration in the longitudinal direction. (Author)

AD-406 885 Div. 10
(TISTM/EJH) OTS price $2.60

Phillips Petroleum Co., Bartlesville, Okla.
GAS TURBINE AND JET ENGINE FUELS.
Bimonthly progress rept. no. 6, Feb-Mar 63, by W. L. Streets. 23 May 63, 13p. 3490 63R
Contract N600 19 58219
Unclassified report

Descriptors: *Jet engine fuels, *Nickel alloys, *Cobalt alloys, *Inlet guide vanes, Gas turbines, Turbine parts, Sulfur, Exhaust gases, Tensile properties, Mechanical properties, Test equipment, Combustion chambers, Chromium alloys, Tungsten alloys, High temperature research, Heat resistant metals and alloys.

Twelve-hour metal loss tests on the effect of sulfur on turbine inlet guide vanes using a 2-inch research combustor operating under conditions producing 2000 F exhaust gases were completed. Data are now available on sulfur-free and 1.0% sulfur fuels. Five typical current-generation superalloys including Udimet 500, Waspalloy, Haynes Alloy 25, Rene 41 and Hastelloy R-235 were evaluated. Results indicate that 1% fuel sulfur or, rather, the gaseous sulfur compounds produced upon combustion of this sulfur, had no effect upon the durability of any of the alloys tested. Haynes Alloy 25, a cobalt-base alloy, showed best performance, Hastelloy R-235 poorest performance. These extremes differed by a factor of about five. The balance of the alloys performed comparably and intermediate between these extremes. Only Haynes Alloy 25 and Waspalloy showed more degradation of tensile strength when exposed to a sulfur atmosphere than when exposed to a sulfur-free atmosphere. HA25 lost nearly twice as much tensile strength with sulfur as without. The indicated degradation of Waspalloy strength by sulfur is considered only marginally significant. All the alloys suffered marked losses in ductility after exposure, suggesting the occurrence of some intergranular oxidation. (Author)

AD-407 364 Div. 10, 27
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FACTORS INFLUENCING THE THERMOSTABILITY OF JET ENGINE FUELS,
by I. N. Danilov and Kh. A. Murzabulatov.
14 May 63, 16p.
FTD TT63 343
Unclassified report

Descriptors: *Jet engine fuels, Thermal stresses, Test equipment, Temperature, Nitrogen, Air, Stability.

Today's jet engine fuels do not have sufficiently high thermostability. At temperatures above 100, which develop when aircraft operate at supersonic speeds, these fuels form insoluble deposits which precipitate on the filters and components of the fuel regulating apparatus, thus lowering engine reliability. The problems of increasing the thermostability of fuels during use are extremely urgent. In this article certain results of investigations reveal a number of factors influencing the thermostability of jet engine fuel. (Author)

AD-407 450 Div. 10
(TISTM/EJH) OTS price $7.60

Wyoming U., Laramie.
COMPUTER CALCULATIONS OF ROCKET ENGINE COMBUSTION PROPERTIES,
by Roy C. Robinette, Jr. May 63, 62p.
Unclassified report

Master's thesis.

Descriptors: *Liquid rocket propellants, *Liquid rocket oxidizers, *Combustion, *Combustion chamber gases, Rocket motors (Liquid rocket propellants), Liquefied gases, Hydrogen, Oxygen, Flames, Thermodynamics, Thermochemistry, Chemical equilibrium, Mathematical analysis, Programming (Computers), Tables, Data.

The scope of this paper is limited to the equi-

librium calculations of combustion products and the resulting adiabatic flame temperature. The problem of attempting to determine the equilibrium constituents as the gases progress through the rocket nozzle is not attempted here. A solution of a relatively simple combustion problem consisting of only six products of combustion is presented. By understanding and following the illustrated procedures a problem consisting of any number of products of combustion may be computed and solved to any desired degree of accuracy. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-407 287 Div. 11
(TISTE/OHD) OTS price $5.60

Army Transportation Board, Fort Eustis, Va.
BOG BUSTERS.
June 63, 53p.
ATB TCB62 183E0
Unclassified report

Report of environmental operation.

Descriptors: *Tracked vehicles, Tests, Army research, Cargo vehicles, Reliability, Human engineering, Swamps.

Project BOG BUSTERS was an environmental operation conducted in Alaska during May and June 1962. The primary objective of the project was to determine the capabilities of selected tracked vehicles to traverse muskeg after the spring thaw. Delayed thawing attributed to unseasonal weather conditions precluded compilation of sufficient data to predict vehicle capabilities for traverse of this type terrain and recommendations were made that further investigations be conducted with the objective of improving transportation capabilities in organic terrain. (Author)

AD-407 667 Div. 11, 6
(TISTP/HSS) OTS price $1.60

Engineering Development Lab., Naval Air Development Center, Johnsville, Pa.
DESCRIPTION OF AERIAL TARGET CONTROL CENTRAL AN/MSQ-51,
by Robert A. Rohrmans. 2 Mar 62, rev. 3 June 63, 4p.
NADC ED L6174B Unclassified report

Descriptors: *Remote control systems, Aerial target, Radar tracking, Target drones, Aircraft, Tracking, Mobile, Radar equipment, Trailers.

The Aerial Target Control Central (ATCC) provides a facility for the remote control of various fixed wing pilotless aircraft. It is composed of four mobile trailers two of which have air-conditioned and heated working spaces and features a self-contained prime power system. The system may be moved over highways or unimproved terrain for emplacement and operation where required. The functional parts of the ATCC are a surveillance radar, a tracking radar, a command control radio system, a radio communications system, and an electrical power system. Certain units are equipped with a telemetry receiving system. (Author)

12. GUIDED MISSILES

AD-406 831 Div. 12
(TISTA/LSK) OTS price $6.60

Boeing Co., Seattle, Wash.
WEAPON SYSTEM REQUIREMENTS AND DESCRIPTION, S-133-10.
16 Feb 63, 1v. D2 30044 1B
Contract AF04 694 266
Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), *Launching sites, Silos, Scheduling, Programming (Computers), Management engineering.

The report presents a detailed functional description of the WS-133B Weapon System. It provides source data for all agencies concerned with the development of equipment elements, facilities criteria, personnel and training requirements, technical manual data, provisioning data and logistics planning. This volume contains the master functional flow diagram and the lower level functional flow diagrams developed during the System Requirements Analysis for the Operational Weapon System. (Author)

AD-406 862 Div. 12, 7, 8
(TISTE/CAM) OTS price $21.00

Boeing Co., Seattle, Wash.
CABLE PLANT DESIGN VERIFICATION TESTS, FLIGHT A, WING I.
Final rept.,
by H. L. Randall. 7 Dec 62, rev. 15 Apr 63, 356p.
Rept. no. T2 2592
Contract AF04 647 289
Unclassified report

Descriptors: *Electric cables, *Guided missiles (Surface-to-surface), Electrical impedance, Radio interference, Noise (Radio), Attenuation, Phase shifters, Telephone lines, Measurement, Programming (Computers), Strategic weapons, Test methods.

The cable plant design verification tests are part of an over-all study and evaluation program that started in July, 1961. The design verification tests were performed. These tests are summarized as follows: (1) open circuit and short circuit impedance measurements; (2) capacity unbalance measurements; (3) near-end and far-end crosstalk measurements; (4) noise measurements (white noise, impulse noise, power line noise); and (5) diphase transmission test. A computer program was used to obtain the cable transmission parameters of characteristic impedance, attenuation and phase shift from the open and short circuit impedance data. (Author)

AD-406 867 Div. 12
(TISTP/GRW) OTS price $7.60

Boeing Co., Seattle, Wash.
WS-133A MAINTAINABILITY PROGRESS REPORT,
by Don Heck and D. E. Cressey. 15 Mar 63, 74p.
Rept. D2 14934 2
Contract AF04 648 289
Unclassified report

Descriptors: *Guided missile (Surface to surface), *Logistics, Tables, Checkout equipment, Maintenance, Air force equipment.

The Maintainability Program Plan for the MINUTEMAN Weapon System is two-fold; it provides both

a Design Review and Evaluation Plan and a Test and Demonstration Plan. The monthly reports contain status of progress and problem areas encountered in each of these plans. (Author)

AD-406 893 Div. 12, 26
(TISTP/AW) OTS price $21.00

Boeing Co., Seattle, Wash.
MISSILE ASSEMBLY AND CHECKOUT SYSTEM REQUIREMENTS - WING II, AF PLANT 77.
1962, 1v. Document no. D2 11162 1
Contract AF04 647 580
Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), Strategic weapons, Checkout equipment, Maintenance, Storage, Production, Guided missile components, Management engineering, Checkout procedures.

AD-406 916 Div. 12
(TISTE/CAM) OTS price $3.60

Boeing Co., Seattle, Wash.
FLIGHT ARTICLE MASS PROPERTIES REPORT FOR WING II CTLI INSTALLATIONS OF MRCN 6301 CTLI SECTION (S/N 0000022 AND ON),
by Vincent Foster. 20 May 63, 33p. D2 13943 2
Contract AF04 694 46
Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), *Guided missile components, Strategic weapons, Weights.

AD-407 023 Div. 12
(TISTA/GEC) OTS price $2.60

Boeing Co., Seattle, Wash.
SITE ACCEPTANCE TEST PROCEDURES WINGS III-V VAFB,
by R. E. Sheffield and R. A. Davis. 1 Apr 63, 27p. Document no. D2 14987 1
Contract AF04 647 757
Unclassified report

Descriptors: *Guided missiles (Surface to surface), *Launching sites, Military requirements, Silos, Command and control systems, Checkout equipment, Acceptability, Checkout procedures.

The purpose of this document is to serve as an index in specifying the equipment, testing, and test procedure documentation required for the Assembly and Checkout Task of the Wing III-V WS-133A Minuteman site located at Vandenberg Air Force Base. (Author)

AD-407 031 Div. 12
(TISTA/GEC) OTS price $3.60

Boeing Co., Seattle, Wash.
AIR FORCE PLANT 77 FLIGHT ARTICLE MASS PROPERTIES REPORT FOR WING II MISSILES 648-669,
by R. L. Dramer. 28 May 63, 31p. Document no. D2 13947 2
Contract AF04 694 46
Unclassified report

Descriptors: *Guided missiles (Surface to surface), Tables, Guided missile components, Weight.

This document contains the actual sealant weight and balance summary for Wing II Minuteman missiles, the weight effect of all changes incorporated at Plant 77 not reported in D2-13946-X, and a configuration page for each missile included in this report. (Author)

AD-407 095 Div. 12, 23
(TISTA/LSK) OTS price $19.75

Boeing Co., Seattle, Wash.
QUALITATIVE PERSONNEL REQUIREMENTS INFORMATION FOR WS-133A MINUTEMAN HARDENED AND DISPERSED.
27 Aug 62, 1v. D2 5859 V1
Contract AF04 647 289
Unclassified report

Descriptors: *Military personnel, *Guided missiles (Surface-to-surface), Sites, Military requirements, Military organization, Launching sites.

This document is a complete revision of the personnel requirements forecast for WS-133A Minuteman, Hardened and Dispersed, reported in the QPRI of 21 April 1961. The major purpose of this complete revision, which reflects the major changes in equipment and concepts that have occurred since April 1961, is to provide a basis for changing the current Unit Manning Document and for up-dating present training plans. This document will also provide a source of data for the further development and/or revision of existing maintenance and operations concepts and plans. (Author)

AD-407 108 Div. 12
(TISTA/LSK) OTS price $7.60

Boeing Co., Seattle, Wash.
WS-133A MAINTAINABILITY PROGRESS REPORT,
by E. Hardy and D. Cressey. 7 May 63, 78p.
D2 14934 5
Contract AF04 648 289
Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), *Guided missile components, *Launching sites, Silos, Maintenance, Maintainability

This document is the fifth of the monthly reports that outline the progress achieved in the WS-133A Maintainability Program. The first report covered the period from 18 October 1962 thru 31 December 1962. Each succeeding report covers a monthly period from the first thru the last day of each month. This report covers the month of April 1963. The Maintainability Program Plan for the Minuteman Weapon System is two-fold; it provides both a Design Review and Evaluation Plan and a Test and Demonstration Plan. The monthly reports contain status of progress and problem areas encountered in each of these plans. (Author)

AD-407 181 Div. 12, 30
(TISTM/EJH) OTS price $8.10

RCA Defense Electronic Products, New York.
SIMULATION OF CABLE PRESSURIZATION. WING I - MINUTEMAN.
Final rept.
28 Mar 63, 84p. MTOR C170
Contract AF04 647 289
Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), *Electric cables, Networks, Pneumatic systems, Pressure, Simulation, Compressors, Launching sites, Silos, Test equipment, Panel boards (Electricity), Tables, Mathematical analysis.

This report presents pneumatic data for the Wing I pressurized cable network. The principal conclusions can be summarized as follows: (1) For the steady state pneumatic condition an adequate protection pressure level can be obtained in the buried cable network by installing

compressors at the LCF's and only selected LF's. This is based on a leakage rate of 0.5 cubic feet per day per mile and compressor inputs of 10 psig. The air leakage in the cable should be held to less than 0.5 cubic feet per day per mile and as close to 0.1 cubic feet per mile as possible, for adequate cable protection and optimum maintenance. The cable pressure simulators employed in this study have proven their usefulness in establishing the cable pressure network design parameters for Wing I, as well as their utility for cable installation quality control. (Author)

AD-407 270 Div. 12
(TISTP/AW) OTS price $5.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
MANEUVERING REQUIREMENTS AND MINIMUM MISS DISTANCES FOR HOMING MISSILES IN A RESTRICTED SET OF ANTI-TANK ENGAGEMENTS,
by Gilbert C. Willems. 17 May 63, 49p.
Proj. 1D22 901A204
AMC RE TR63 6 Unclassified report

Descriptors: *Guided missile trajectories, *Proportional navigation, Terminal guidance, Equations, Data, Errors, Analog systems, Simulation, Antitank ammunition.

The homing trajectory equations are solved for a limited set of anti-tank engagement parameters, resulting in quantitative data on required missile maneuverability to overcome various perturbations. The theoretical minimum miss distances (noiseless) are calculated for coasting terminal trajectories. (Author)

AD-407 350 Div. 12, 2
(TISTP/RLG) OTS price $18.00

Marshall Space Flight Center, Huntsville, Ala.
A BIBLIOGRAPHY CONCERNING ASPECTS OF THE METEOROID HAZARD,
by John B. Gayle, Charles C. Dalton, Henry L. Martin, William D. Murphree, and Charlotte F. Shenk. 1 Apr 63, 302p.
MDWG63 2
Unclassified report

Descriptors: *Meteors, *Spacecraft, *Impact shock, Data, Protective coverings, Protective treatments, Analysis, Theory, Symposia, Determination, Instrumentation, Meteorites, Earth, Moon, Interstellar matter, Asteroids, Solar systems, Hypervelocity guns, Ballistics, Hypervelocity projectiles, Cratering, Atmosphere entry, Cosmic rays, Extraterrestrial radio waves, Satellites (Artificial), Ablation, Bibliographies, Hazards, Hypersonic characteristics.

A bibliography, consisting of 876 entries, was compiled to present information on the physics of hypervelocity impact and the meteoroid hazard. Divided into nine general sections, it contains surveys of experimental data, vehicle protection analysis, theoretical studies (hypervelocity impact), experimental investigations, experiments and instrumentation, and theoretical studies (meteoritics). Most of the references are fairly recent, having been published between January 1950 and October 1962. The entries were obtained from all known sources, and the author, title, agency, periodical, and DDC numbers (when known) are included. An abstract by the author is furnished where available, but in some cases the abstracts were prepared by the Meteoroid Damage Working Group. (Author)

AD-407 415 Div. 12, 30
(TISTM/AM) OTS price $6.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
SPACE SIMULATION CHAMBER INSTRUMENTATION,
by M. R. Mulkey, R. E. Klautsch, G. A. Rayfield and F. G. Sherrell. June 63, 62p.
Contract AF40 600 1000, ARO Proj. SM2301
AEDC TDR63 113 Unclassified report

Descriptors: *Space environmental conditions, *Instrumentation, *Measurements, Low pressure research, Thermal radiation, Cryogenics, Test vehicles, Meters, Spectrum analyzers, Simulation.

The measurement of chamber and test vehicle parameters in large space environmental chambers has become a new technology in the field of instrumentation. Modification of old established techniques and the development of new techniques for the purpose of measurement of multi-channel parameters associated with space chamber testing has become of utmost importance in recent years. This paper contains a comprehensive state-of-the-art examination in the field of space environmental chamber instrumentation. (Author)

AD-407 422 Div, 12
(TISTA/GEC) OTS price $5.60

Boeing Co., Seattle, Wash.
INTEGRATED BASE SUPPORT REQUIREMENTS, GRAND FORKS AIR FORCE BASE,
by R. C. Adams. 5 June 63, 51p. D2 6819 6
Contract AF04 694 266
Unclassified report

Descriptors: *Guided missiles (Surface to surface), Military requirements, Silos, Construction, Maintenance, Ground support equipment, Launching sites.

Integrated support and services responsibilities are presented as they apply to the site activation tasks at the Minuteman Hardened and Dispersed Wing VI. (Author)

AD-407 431 Div. 12
(TISTP/FEM) OTS price $2.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT - ADDENDUM TO FTM 434, MODEL SPECIFICATION -- S-133-1007C,
by Carl J. Lesh. 22 May 63, 14p. Rept. no. D2 10889 1, vol. 51A
Contract AF04 647 289
Unclassified report

Addendum to rept. no. D2-10889, Vol. 51.

Descriptors: *Guided missiles (Surface-to-surface), Quality control, Tests, Temperature, Specifications.

AD-407 476 Div. 12
(TISTM/AM) OTS price $5.60

Boeing Co., Seattle, Wash.
ANALYSIS - EFFECT OF DEPTH INCREASE, LAUNCH TUBE, WING V,
by Edwin L. Barber. 4 June 63, 51p. Document no. D2 15132
Contract AF04 647 289
Unclassified report

Descriptors: *Silos, *Design, Maintenance, Launching sites, Guided missiles (Surface-to-surface), Human engineering.

AD-407 548 Div. 12
(TISTP/RLG) OTS price $2.60

Ogden Air Materiel Area, Hill Air Force Base, Utah.
SERVICE LIFE TEST OF CARTRIDGE SHACKLE EJECTOR FOR THE GAM-72 MISSILE,
by Kenneth A. Kartchner. June 63, 19p.
OOY TR63 13

Unclassified report

Descriptors: *Guided missiles, *Cartridges (PAD), *Life expectancy, Test facilities, Pressure, Time, Exploding wires, Data, Fastenings, Explosive actuators, Tests.

Tests were initiated to determine the effects of operational service conditions on the useful life of the Cartridge, Shackle Ejector AMF 105-023-1100. The actual life in service had not exceeded two years on any of the test cartridges. The cartridges were fired in a closed chamber having a volume approximately equal to the shackle ejector in locked shut condition. The average of maximum pressures obtained in the tests were close to those obtained during the qualification test. However, the maximum pressures were more random in nature. The length of time between firing of the primer and the buildup of pressure in the closed chamber was longer than that obtained during the qualification test. The results of the tests show that there was a slight decline in performance of the cartridges after two years of operational service. The test data shows that the cartridges were installed for two years are still serviceable. It is recommended that the service life of the cartridge be extended from one year to two years. (Author)

AD-407 676 Div. 12
(TISTP/HSS) OTS price $2.60

Mitre Corp., Bedford, Mass.
ESTIMATES OF ERRORS IN MISTRAM DUE TO ATMOSPHERIC REFRACTION,
by R. K. Crane. May 63, 17p. TM3422
Contract AF33 600 39852, Proj. 701
ESD TDR63 158

Unclassified report

Descriptors: *Guided missile tracking systems, *Guided missile trajectories, Atmospheric refraction, Refractive index, Refraction, Guided missile ranges, Transponders, Ranges (Distance), Errors, Measurement.

The atmosphere causes errors in the measurement of range, range difference, range rate, and range difference rate. The magnitudes of these errors are estimated and found to exceed the maximum allowable errors for Mistram. Refractive index corrections must be applied to the Mistram System to reduce the errors to the same magnitude as the maximum allowable errors. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-407 076 Div. 13
(TISTP/RLG) OTS price $1.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
BYRD STATION SNOW TUNNELS - WALL CLEARING STUDY. Final rept.,
by C. W. Terry. Apr 63, 9p.
Proj. Y F015 11 001
NCEL TN N 510 Unclassified report

Descriptors: *Underground structures, *Ice, *Creep, Snow, Disposal, Damage, Cleaning, Maintenance equipment, Polar regions, Measurement.

Present data on the closure rates in most of the tunnels at New Byrd Station, Antarctica indicates that trimming of the walls to maintain desirable clearances will not be required before Deep Freeze 65. A review of the Byrd Station drawings showed that about 75% of the tunnel wall surfaces will allow a relatively high degree of mechanization for economical wall trimming. Buildings and other obstructions will necessitate hand clearing in the remaining 25%. On a basis of tunnel clearing work at Camp Century, Greenland, tentative methods and equipment for trimming the walls and disposing of the waste snow were selected for Byrd Station. It was concluded that specific rates of closure and maximum allowable safe closures for the Byrd tunnels should be established at an early data. Also, precise techniques and equipment should be determined for each different tunnel situation during Deep Freeze 64. (Author)

AD-407 586 Div. 13
(TISTP/MH) OTS price $16.00

Massachusetts Inst. of Tech., Cambridge.
STATIC TESTS UPON THIN DOMES BURIED IN SAND,
by Robert V. Whitman, Zvi Getzler and Kaare Hoeg.
Dec 62, 1v.
Contract DA22 079eng224, Proj. R62 41

Unclassified report

Report on The Response of Soils to Dynamic Loadings.

Descriptors: *Structures, Sand, Soil mechanics, Soils, Statics, Pressure, Load distribution, Loading, Stresses, Compressive properties, Strain gages, Tables, Tests.

Thin-walled domes were buried within a sand mass which was 5 feet in diameter. A uniform static pressure was applied to the top surface of the sand mass. Instrumentation measured the total vertical force reaching the dome, vertical movements of the dome, strains within the dome, and movements within the sand mass. Relatively little negative arching was observed when the dome had a stiff support, but considerable positive arching did appear when the support for the dome was ''soft''. The buried domes did not develop a ''snap-through'' buckling under an average vertical pressure almost three times the pressure that buckled the dome when unburied; rather the buried domes yielded as the result of bending stresses near the support. It was generally possible to increase the surface pressure considerably even after the domes failed near the support, and under certain conditions the additional deformation in the dome was quite small. (Author)

14. MATERIALS (NON-METALLIC)

AD-406 932 Div. 14, 25
(TISTM/REB) OTS price $5.60

Monsanto Research Corp., Everett, Mass.
RESEARCH FOR HIGH TEMPERATURE ELASTOMERIC

INSULATION MATERIALS.
Quarterly progress rept. no. 3, 15 Nov-15 Feb 62,
by John E. Wyman, Joseph J. Byrne and Anthony F. Wilde. 15 Mar 63, 54p. Rept. MRB2021Q3
Contract AF33 657 8774, Proj. 62 6899 7340, Task 734005
Unclassified report

Descriptors: *Elastomers, *Synthetic rubber, *Ablation, *Thermal insulation, Nickel, Catalysts, Decomposition, Composite materials, High temperature research, Heating, Pyrolysis, Heat transfer, Carbon, Refractory materials.

The quantity of carbon-aceous residue formed by thermal decomposition of the rubber can be increased by using a supported Ni catalyst for part of the refractory normally used in an elastomeric insulating material. Ni metal catalysts are more effective in saturated rubbers than in diene rubbers. Initial decomposition products from a butyl rubber appear to be more susceptible to catalytic cracking than those from an ethylene-propylene rubber. In all cases, increased yields of carbonaceous residue were accompanied by increase in total quantity of H gas. Refractory support used for the Ni metal catalyst greatly influences activity of the catalyst and appears to affect the strength of the resulting char layer. Increasing C to C crosslinkages in an ethylene-propylene rubber does not increase the quantity of char. Thermal decomposition of 2 uncured commercial elastomeric insulating materials showed the rubbers employed yield a small amount of char. Calculations show that transpirational heating of H gas is the most important mechanism by which a thermally decomposing rubber can absorb heat in an ablating elastomeric insulating material. The heat sink effect of the C is the next most important mechanism. (Author)

AD-406 945 Div. 14, 25
(TISTM/ODN) OTS price $1.75

Armour Research Foundation, Chicago, Ill.
INVESTIGATION OF MATERIALS FOR MECHANICAL TRANSMISSION OF DEFLECTIONS AT ELEVATED TEMPERATURES.
Final rept. for 15 June 61-30 July 62,
by Joseph S. Islinger and Edward L. McDowell.
May 63, 59p.
Contract AF33 616 8444, Proj. 1347, Task 134702
ASD TDR62 834 Unclassified report

Descriptors: *Ceramic materials, *Quartz, *Aluminum compounds, Rods, Thermal radiation, Loading (Mechanics), Tests, High-temperature research, Theory, Mathematical models, Thermodynamics, Thermal expansion, Mechanical properties, Instrumentation, Experimental data, Test equipment, Transducers (Acoustic), Deflection, Thermal stresses, Oxides.

Investigations were made of materials and methods for mechanically transmitting deflections from a structure under radiant heating to a transducer at room temperature. Transparent fused quartz rods were evaluated for expansion and thermal shock resistance. Rod growth was measured for such rods under several heating rates, with various exposed rod lengths and at temperatures up to 2000 F. The growths enabled fairly accurate monitoring of static and cyclic displacements of a plate to which a transducer was connected through the quartz rod. High purity recrystallized alumina rods were evaluated for expansion and thermal shock resistance. Rod growth was also measured under several heating rates for a limited exposed length and at temperatures approaching 3000 F. The measured growths were considerably greater than those experienced by the quartz rods but not by a factor equivalent to the ratio of their thermal expansions. A successful means for attaching such rods to alumina structures capable of following static and cyclic displacements was developed. (Author)

AD-407 009 Div. 14, 26, 17
(TISTM/AMS) OTS price $1.10

General Dynamics Convair, San Diego, Calif.
MATERIAL - ADHESIVES - CERAMIC FOR BONDING FELTED STAINLESS STEEL FIBERS, BONDING FEASIBILITY,
by D. S. Pratt, H. C. Turner, and W. M. Sutherland. 15 Sep 60, 7p. 8926 141
Contract AF33 657 8926
Unclassified report

Descriptors: *Adhesives, *Ceramic materials, *Bonding, *Stainless steel, Fibers, Coating, Manufacturing methods, Sandwich panels, Feasibility studies, Reinforcing materials.

Three different ceramic adhesives were used to attach 0.010 by 2 by 2 inch pieces of 17-7 PH stainless steel to 3/4 by 2 by 2 inch pieces of felted 17-4 PH stainless steel fiber pads. Firing temperatures of 1050 and 1750 F were used to effect the bonds. The application of force normal to the faces of the panels indicated the presence of good adhesion, since bond failures were of the cohesive failure type: peeling forces when applied resulted in ready separation of the face plate from the pad, thus indicating a lack of resistance of bending in the bond. (Author)

AD-407 069 Div. 14, 25
(TISTM/AMS) OTS price $2.60

Materials Research Corp., Orangeburg, N. Y.
THE ROLE OF THE GRAIN BOUNDARY IN THE DEFORMATION OF CERAMIC MATERIALS.
Report for Jan 62-Jan 63,
by G. T. Murray and A. J. Mountvala. Mar 63, 24p.
Contract AF33 616 7961, Proj. 7350, Task 735003
ASD TDR62 225, pt. 2 Unclassified report

Report on Refractory Inorganic Nonmetallic Materials.

Descriptors: *Ceramic materials, *Creep, *Fracture (Mechanics), High-temperature research, Shear stresses, Transition temperature, Deformation, Crystals, Temperature, Magnesium compounds, Oxides, Tests, Test methods, Microstructure, Experimental data.

The mechanical behavior of MgO grain boundaries at elevated temperatures was investigated. The shear strength of bicrystal specimens was obtained (constant loading rate tests) at 1400 C for a wide range of crystal misorientations. Large twist, low tilt boundaries fractured at extremely low stress compared to other misorientations. For a given tilt angle the fracture stress decreased with increasing twist component; the decrease being sharper for low tilt boundaries and more gradual for boundaries possessing large tilt components. The effect of temperature on the grain boundary fracture stress was investigated for varying misorientations in the range 1200 - 1500 C. For each type of boundary orientation there was a characteristic temperature where there was a sudden drop in strength, this transition temperature being lowest for boundaries with a high twist component. Experiments on tricrystals indicated that the weaker twist-type boundaries controlled the fracture strength of the entire body. (Author)

AD-407 072 Div. 14
(TISTM/TCG) OTS price $3.60

Snell, Foster D., Inc., New York.
DEVELOPMENT OF ULTRA-THIN FILM PRESERVATIVE COMPOUNDS.
Quarterly rept. no. 2, 1 Feb-30 Apr 63.
30 Apr 63, 28p.
Contract NOw63 0293 Unclassified report

Descriptors: *Cellulose acetates, *Cellulosic plastics, *Films, Protective treatments, Additives, Compatibility, Silicone plastics, Adhesion, Epoxy plastics, Steel, Metals, Acrylic resins, Polymers, Corrosion, Coatings, Corrosion inhibition.

Inhibitor-modified films of cellulose acetate butyrate and Acryloid B-72 afford generally good corrosion protection under cyclic condensation conditions, but have poor adhesion to metal surfaces. Nonyl phenoxy acetic acid is an effective inhibitor in acrylic, epoxy and cellulose acetate butyrate films, while Alox 2028 is effective in Piccopale 100 films. Films tested in the controlled cyclic condensation humidity cabinet which gave promise of affording a high degree of protection from corrosive attack were applied to test panels and exposed in a louvered outdoor shed. Except for Ucar R-104 (a heat-cured organo-functional silicone), these films, after thirty days exposure, show good corrosion protection of steel. (Author)

AD-407 098 Div. 14
(TISTM/ODN) OTS price $4.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
OPTIMUM CONSTRUCTION OF REINFORCED PLASTIC CYLINDERS SUBJECTED TO HIGH EXTERNAL PRESSURE.
Quarterly progress rept. no. 1, 6 Mar-6 June 63,
by H. R. Jacobson. 6 June 63, 38p. SM44057
Contract NObs88425, Proj. SF013 05 03, Task 1025
Unclassified report

Descriptors: *Cylindrical bodies, *Filament wound construction, *Deformation, Reinforcing materials, Plastics, Loading (Mechanics), Materials, Laminated plastics, Stresses, Mathematical analysis, Elasticity, Manufacturing methods, Tests, Glass textiles, Mandrels, Pressure, High pressure research, Differential equations, Construction, Theory.

The purpose of this program is to develop and prove out a theoretical method for accurately predicting the critical buckling strength of externally pressurized cylinders made from orthotropic materials and to find the optimum construction of filament reinforced plastic (FRP) cylinders under such loading. A description of the program and its significance to the overall BuShips Deep Submergence program and a summary of the work accomplished to date are given. Theoretical analytical expressions for predicting elastic buckling collapse and elastic constants of FRP cylinders are presented and discussed. Results of initial buckling and discontinuity stress analysis of propsoed test cylinders are presented. (Author)

AD-407 252 Div. 14, 26
(TISTM/AMS) OTS price $2.60

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
LIGHTWEIGHT REINFORCED PLASTIC FACED SANDWICH CONSTRUCTION,
by M. E. Phelps. June 63, 17p.
PSNS-ML Rept. no. P565 Unclassified report

Descriptors: *Sandwich construction, *Isocyanate plastics, Sandwich panels, Foams, Laminated plastics, Plastics, Wood, Adhesives, Reinforcing materials, Density, Mechanical properties, Weight, Impact shock, Elasticity, Experimental data, Laminated glass.

The values of impact and flexure properties of sandwich panels with polyurethane foam and balsa wood cores with laminated glass-resin faces are shown. (Author)

AD-407 260 Div. 14, 26
(TISTM/AMS) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
LINER FOR EXTRUSION BILLET CONTAINERS.
Interim technical documentary progress rept.,
1 Feb-30 Apr 63,
by S. A. Spachner. 30 Apr 63, 21p.
Contract AF33 657 8784, Proj. 7 945
ASD TDR7 945, vol. 3 Unclassified report

Descriptors: *Extrusion, *Containers, *Machine tools, Steel, Heat resistant metals and alloys, Ceramic materials, Carbides, Borides, Welding, Performance tests, Oxides, Cylindrical bodies, High temperature research, Design, Aluminum compounds, Magnesium compounds, Zirconium compounds, Silicon compounds, Molybdenum, Tungsten, Titanium compounds, Tantalum compounds, Zirconium compounds, Vanadium compounds, Niobium compounds, Fibers, Mechanical properties.

Shrink-fit assembly device for buildup of ceramic-coated liner and sleeve assemblies was tested and modified to develop desired temperatures and suitable heat distribution in sleeves which were heated. Nine different compositions of fiber metal reinforced ceramic compacts were produced for preliminary evaluation of suitability for extrusion liner use. Procedures were developed for welding short, hollow ceramic cylinders of high-strength metal carbides and borides to form a ceramic extrusion liner of suitable length. Disassembly tooling for rapid separation of shrink-fitted sleeves from a worn liner was designed, fabricated, and tested. Two complete 3-sleeve liner support assemblies were fabricated and tested. Preliminary extrusion testing of an alumina-coated liner was carried out, using SAE 4340 steel billets extruded to rod at 12:1 and 16:1 ratios. No coating wear was noted after extrusion of 3 billets. Required pressing force for SAE 4340 steel, heated to 2200 F and extruded at a 16:1 ratio, was only 200 tons. (Author)

AD-407 316 Div. 14
(TISTM/ODN) OTS price $.50

Naval Research Lab., Washington, D. C.
A COMPARISON OF STATIC AND DYNAMIC PROPERTIES OF PHOTOELASTIC MATERIALS,
by A. B. J. Clark and R. J. Sanford. 29 May 63, 7p.
NRL 5940 Unclassified report

Descriptors: *Photoelasticity, *Epoxy plastics, Mechanical properties, Elasticity, Test equipment, Test methods, Dynamics, Statics.

The dynamic values of the modulus of elasticity and photoelastic fringe constant of Homalite 100 and ten epoxy resins were determined. Of these eleven materials, it was found that five exhibited desirable dynamic properties including two materials which exhibited no appreciable changes in fringe constant. Consequently a static cali-

bration on these materials can be used for dynamic experiments with a high degree of accuracy. Included in this group of five materials were three materials which can be purchased in precast shapes, thus enabling laboratories without casting facilities to obtain suitable materials for dynamic photoelastic experiments. (Author)

AD-407 317 Div. 14, 25, 8, 7
(TISTE/OHD) OTS price $2.60

Little, Arthur D., Inc., Cambridge, Mass.
SUPERCONDUCTIVE EFFECTS IN THIN FILMS.
Interim engineering rept. no. 5, 15 Jan-15 Apr 63,
by S. Shapiro. 15 May 63, 22p. C64380
Contract AF33 657 7915
Unclassified report

Descriptors: *Superconductivity, *Films, *Metal films, *Superconductors, Measuring devices (Electrical and electronic), Frequency meters, Bandwidth, Aluminum, Tin, Resistance (Electrical), Cavity resonators, Electrical properties, Microwave equipment, Quantum mechanics.

Improvements were made in the measurement of microwave cavity Q. A cw local oscillator beating against the fm signal klystron generates a band of beat frequencies. A tunable radio receiver selects the desired narrow band. After shaping by an RC circuit, this band is used to trigger a pulse generator resulting in a pair of very sharp markers separated by a controllable and accurately measurable amount in frequency. Thus the bandwidth of the cavity characteristic can be accurately determined leading to a much improved Q measurement. Despite the use of thin Al films in low resistance crossings, or the use of poor RC crossings, no quantum effects were observed in the presence of microwave power. It was noted that magnetic flux was sometimes trapped in the films forming the sample. This resulted in substantial rounding of the sharp corner in the I-V characteristic and care was taken to avoid the effect. The square wave response of a sample operated as a microwave detector was examined up to the limit of the oscilloscope used, less than 1 megacycle. The tunneltron response was found not limiting. Zero-voltage currents associated with the tunneling of electron pairs have been observed in all low resistance samples. An ac technique was used which permitted a demonstration that these currents were not due to superconducting short circuits. (Author)

AD-407 338 Div. 14, 16
(TISTM/BRW) OTS price $5.60

Polytechnic Inst. of Brooklyn, N. Y.
REFRACTORY BINARY BORIDES,
by Ben Post. 1962, 64p. TR6
Contract Nonr839 12, Proj NR032 414
AEC NP12652
Unclassified report

Descriptors: *Refractory materials, *Borides, Preparation, Crystal structure, Phase studies, Boron compounds, Nitrides, Phosphides, Arsenides, Actinide series compounds, Alkali metal compounds, Alkaline earth compounds, Aluminum compounds, Rare earth compounds, Gold compounds, Silver compounds, Platinum compounds, Titanium compounds, Zirconium compounds, Hafnium compounds, Vanadium compounds, Niobrium compounds, Tantalum compounds, Chromium compounds, Molybdenum compounds, Tungsten compounds, Chemical properties, Magnetic properties, Electrical properties, Mechanical properties, Thermal conductivity, Chemical bonds.

AD-407 393 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
MATERIAL - FINISHES AND COATINGS - REFLECTIVE TAPES - NO. 630, 633 and 3270, MINNESOTA MINING AND MANUFACTURING CO. REFLECTANCE CHARACTERISTICS,
by B. H. Faulkenberry, F. M. Graber, and E. E. Keller. 7 May 59, 17p. 8926 104
Contract AF33 657 8926
Unclassified report

Descriptors: *Tapes, *Films, Spectrophotometers, Finishes and finishing, Experimental data, Reflection.

The specular reflectance of No. 633 gold colored D.S. Scotchcal, and No. 630 chrome colored D.S. Scotchcal films, and No. 3270 silver W/A D.S. Flat Top (R) Scotchlite reflective film was determined in the 0.35 to 2.5 micron wavelength range with a Beckman DK-2 recording spectrophotometer, and in the 1.0 to 15 micron wavelength range with a Beckman IR-4 recording spectrophotometer. Recordings of all measurements are given. (Author)

AD-407 515 Div. 14, 15
(TISTM/ODN) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
THERMAL STUDIES OF REINFORCED-PLASTIC MATERIALS. PART 2. PROPERTIES OF NINE REINFORCED-PLASTIC LAMINATES,
by L. Sedillo, T. T. Castonguay, and W. E. Donaldson. Apr 63, 28p.
NAVWEPS 7918, pt 2; NOTS TP2938
Unclassified report

Descriptors: *Laminated plastics, *Specific heat, *Thermal conductivity, *Thermal diffusion, Theory, Test methods, Test equipment, Sheets, Phenolic plastics, Glass textiles, Sandwich construction, Graphite, Laboratory equipment, Silanes, Asbestos, Textiles, Impregnation, Experimental data, Tables, Density, Thermodynamics.

The thermal conductivity and specific heat of nine plastic laminates were experimentally evaluated, whereas the thermal diffusivity of the test materials at 140 F was calculated from its relationship to thermal conductivity, specific heat, and density. Data for evaluating thermal conductivity were obtained by using a guarded hot plate apparatus under steady-state conditions. Values of thermal conductivity were plotted versus temperature, and by the method of least squares an equation was formulated expressing thermal conductivity as a function of temperature. The classical method of mixtures was used to evaluate the specific heat of the test materials at a mean temperature of 140 F. Along with test results are included recommendations concerning the thermal conductivity apparatus and the specific heat apparatus used in the tests, and a recommendation for the construction of a radiant heat facility for determining thermal diffusivity directly. (Author)

AD-407 550 Div. 14, 30, 8
(TISTM/ODN) OTS price $2.75

Hughes Aircraft Co., Culver City, Calif.
ELECTRICAL AND ELECTRONIC PROPERTIES OF MATERIALS - INFORMATION RETRIEVAL PROGRAM.
Final rept., 15 June-14 Dec 62,
by H. Thayne Johnson, Donald L. Grigsby and Dana H. Johnson. Apr 63, 122p. Rept. no. P63 15
Contract AF33 616 8438, Proj. 7381, Task 738103
ASD TDR62 539 P2 Unclassified report

Descriptors: *Information retrieval, *Indexes, *Documentation, Abstracts, Ferroelectric materials, Ferrites, Ferromagnetic materials, Metals, Electroluminescence, Superconductors, Electrical properties, Semiconductors, Organic compounds, Alloys, Thermionic emission, Materials.

A documentation system was established for abstracting, indexing, and retrieving data relative to the electrical and electronic properties of materials. That data and the literature are retrieved through a modified manual coordinate index highly adaptable to machine usage. Publications include data sheets, thesauri, property tables, and summary reviews. Methods and routines of the system were described in the first final report, Technical Documentary Report No. ASD-TDR-62-539. Appended are a consolidated list of electrical and electronic properties and lists in the following categories of materials: Electroluminescent Materials, Thermionic Emitters, Ferroelectrics, Ferrites, Ferromagnetics, Super-conductors and Metals. (Author)

AD-407 554 Div. 14
(TISTM/ODN) OTS price $1.10

DeBell and Richardson, Inc., Hazardville, Conn.
FEASIBILITY STUDY ON HEXAGONAL GLASS FILAMENTS. Final rept.,
by Richard A. Humphrey. 21 June 63, 7p.
Contract Nonr388500
Unclassified report

Descriptors: *Glass textiles, *Filaments, Feasibility studies, Preparation, Photomicrography, Ceramic fibers, Fibers (Synthetic).

It was demonstrated that hexagonal filaments can be made from E glass by the preform attenuation technique. A procedure was developed for grinding flats on round rods in order to produce hexagonal preforms. Strength tests on single filaments proved the desirability of acid polishing the gound preforms prior to forming filaments. Photomicrographs of a sample of hexagonal filaments forced together in an imbedding resin show perfect packing. (Author)

AD-407 614 Div. 14
(TISTM/ODN) OTS price $7.60

Honeywell Research Center, Hopkins, Minn.
MICROSTRUCTURE AND MECHANICAL PROPERTIES OF CERAMICS,
by R. J. Stokes. May 63, 63p. Technical rept. no. 19; HR63 264
Contract Nonr407600, Proj. NR032 451
Unclassified report

Descriptors: *Ceramic materials, *Reviews, *Microstructure, Mechanical properties, Elasticity, Deformation, Creep, Fracture (Mechanics), High-temperature research, Crystal structure, Impurities, Crystal lattice defects, Aluminum compounds, Magnesium compounds, Oxides, Theory, Internal friction, Attenuation, Dispersion hardening, Single crystals, Silver compounds, Sodium compounds, Chlorides, Phase studies, Heat treatment, Tensile properties, Diffusion, Pososity.

In this review paper the influence of microstructure on the following aspects of mechanical behavior was considered, (1) elastic deformation, (2) anelastic behavior, (3) plastic deformation, (4) brittle fracture, and (5) high temperature deformation and creep. In addition to familiar variables such as grain size and the presence and distribution of porosity or a second phase, the term microstructure was considered broadly enough to allow discussion of the role that fundamental variables such as crystal structure, bond character and crystalline defects, impurities, vacancies and dislocations play in determining mechanical behavior. (Author)

AD-407 618 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
MATERIAL - ADHESIVE FIBERGLASS CLOTH TO METAL ATTACHING, SCREENING EVALUATIONS,
by H. H. Hunt, R. W. Jenkins, G. L. Picotte, and W. M. Sutherland. 29 Mar 57, 10p. Rept. no. 8926 168; 56 309
Contract AF33 657 8926
Unclassified report

Descriptors: *Glass textiles, *Plastics, *Adhesives, Materials, Epoxy plastics, Polyester plastics, Polyamide plastics, Polymers, Isocyanate plastics, Deformation, Bonding, Organic sulfur compounds, Mandrels, Laminates.

Thirty-two formulations of adhesive materials containing epoxy, polyester, polysulfide, polyamide, polyurethane or phenolic resins were screened by means of peel tests and bend tested to determine their possible utility for attaching fiberglass cloth to metal at room and elevated temperatures. Fourteen of these formulations were promising for room temperature application and ten were promising for elevated temperature (cured) application. (Author)

AD-407 620 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
MATERIAL - ADHESIVES - STRUCTURAL - METLBOND 4021. EFFECT OF GENTIAN VIOLET DYE ON TENSILE SHEAR STRENGTH,
by V. Lintvedt, M. C. Miyaji, and W. M. Sutherland. 26 July 57, 10p. Rept. no. 8926 158; 56 39
Contracts AF33 657 8926 and AF33 600 23903
Unclassified report

Descriptors: *Adhesives, *Bonded joints, Bonding, Tensile properties, Shear stresses, Metals, Dyes, Creep, Experimental data, Low-temperature research, Mechanical properties.

The addition of 0.1% gentian violet to Metlbond 4021 adhesive primer was evaluated with respect to its effect on the strength of metal to metal bonds. Tensile-shear tests were made to compare tinted with un-tinted primers used in the preparation of joints which were bonded at 275 F under a pressure of 100 psi. The comparative test results showed that the dye did not adversely affect the Metlbond 4021 primer. (Author)

15. MATHEMATICS

AD-406 877 Div. 15
(TISTP/MFA) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
A COMBINATORIAL ANALOGUE OF POINCARE'S DUALITY THEOREM,
by Victor Klee. May 63, 21p. D1 82 0248; MN293
Unclassified report

Also available from the author.

Descriptors: *Scheduling, *Binomials, Mathematical logic, Polynomials, Matrix algebra, Topology, Combinatorial analysis, Inequalities.

Division 15 - MATHEMATICS

AD-406 911 Div. 15, 30
(TISTP/MFA) OTS price $1.60

Israel Inst. of Tech., Haifa.
ON HOMOMORPHIC IMAGES OF TRANSITION GRAPHS,
by Michael Yoeli and Abraham Ginzburg. Apr 63, 10p. TR11
Contract N62558 3510
Unclassified report

Descriptors: *Input-output devices, Factor analysis, Series, Sequential analysis, Images, Transformations (Mathematics), Sequences.

A simple method is derived for obtaining all homomorphic images of a given complete or partial transition graph. This method consists of the successive application of elementary steps, corresponding to four types of 'elementary' congruences. Furthermore, it is shown that the number of elementary steps required to derive a given homomorphic image is constant, if the original transition graph is complete and connected. (Author)

AD-407 038 Div. 15
(TISTP/MFA) OTS price $2.60

Florida State U., Tallahassee.
THE MODIFIED TRIANGLE TEST,
by Ralph A. Bradley and Tom J. Harmon. Apr 63, 25p. TR8
Contract Nonr98808, Proj. NR042 004
Unclassified report

Report on The Development of Statistical Methods for Quality Control and Surveillance Testing, Subjective Testing and Quality Evaluation.

Descriptors: *Stochastic processes, *Sensory mechanisms, Probability, Density, Tests, Partial differential equations, Programming (Computers), Quality control, Mathematical models, Statistical tests, Analysis.

The triangle test has been used very frequently in sensory difference testing. Attempts have been made to augment the basic information from triangle tests with scores on degree of difference between the sample selected as the variant and the remaining two. A mathematical model has been developed to permit formal utilization of the degree of difference scores. It is assumed that a stimulus-response scale exists and that two standard samples and one variant sample evoke responses x sub 1, x sub 2, and y on this scale. These responses are taken to have independent normal distributions with variances sigma squared and means zero for the x-variates and mean mu for the y-variate. Conditional distributions for degree of difference scores are obtained, the likelihood function for N independent trials of the triangle test is developed, and a procedure for testing that mu = 0 is given. The procedure considered is designated as the modified triangle test and illustrations of its use are shown. (Author)

AD-407 122 Div. 15
(TISTE/OHD) OTS price $3.60

Utica Coll. of Syracuse U., N. Y.
DEVELOPMENT OF NON-PARAMETRIC TECHNIQUES TO THE RELIABILITY TESTING OF AIR FORCE GROUND ELECTRONIC EQUIPMENT,
by Thomas J. Burke and Daniel Goss. Sep 62, 29p.
Contract AF30 602 2282
RADC TDR62 499 Unclassified report

Descriptors: *Statistical analysis, *Statistical tests, Game theory, Reliability (Electronics), Electronic equipment, Sampling.

This is a study of several randomization tests of statistical inference. For testing the randomness of a sequence of observations, the runs test and the serial correlation test are discussed. Some aspects of decision theory are discussed. Among the topics considered are definitions, basic principles, the pay-off matrix, utility theory, and principles of choice. The report concludes with critical comments on utility theory and principles of choice. (Author)

AD-407 290 Div. 15
(TISTP/FEM) OTS price $12.00

Liege U. (Belgium).
DIFFERENTIAL EQUATIONS WITH FIXED CRITICAL POINTS. PART I: SECOND ORDER EQUATIONS,
by F. J. Bureau. Mar 63, 166p. TR1
Contract AF61 052 612
AFOSR 4866 Unclassified report

Descriptors: *Differential equations, *Integration, Algebra, Integral equations, Polynomials, Equations, Matrix algebra, Functions, Transformations (Mathematics), Partial differential equations.

AD-407 345 Div. 15
(TISTP/AW) OTS price $4.60

RAND Corp., Santa Monica, Calif.
SOME TOPICS IN TWO-PERSON GAMES,
by Lloyd S. Shapley. June 63, 42p. RM3672PR
Contract AF49 638 700
Unclassified report

Descriptors: *Game theory, Matrix algebra, Determinants, Transformations (Mathematics).

Several loosely-related essays on the theory of finite, two-person games are presented. The topics covered are: (1) the block decomposition of symmetric games; (2) saddlepoints in matrices having submatrices with saddlepoints; (3) generalized saddlepoints and 'order matrices'; (4) the existence of values in games with almost-perfect information; and (5) the nonconvergence of 'ficitious play' in non-zero-sum games. Throughout, there is an emphasis on features of the theory that depend only on the ordering of the payoffs, as opposed to their numerical values. (Author)

AD-407 400 Div. 15
(TISTP/MFA) OTS price $2.60

California U., Los Angeles.
ACTUAL VERSUS CONSISTENT DECISION BEHAVIOR,
by Jacob Marschak. May 63, 21p. Working Paper no. 33
Contract Nonr23375, Task 047 041
Unclassified report

Descriptors: *Decision working, Management engineering, Probability, Numerical analysis, Costs, Economics, Stochastic processes.

AD-407 402 Div. 15
(TISTP/JAB) OTS price $1.10

North Carolina U., Chapel Hill.
ESTIMATION AND TESTING OF PARAMETERS OF DISTRIBU-

TIONS BY ORDER STATISTICS.
Semi-annual progress rept. no. 6, (Final),
1 Apr 60-31 Mar 63,
by Bernard G. Greenberg. 31 Mar 63, 5p.
Grant DA ORD7 2776M
AROD 2776 11 Unclassified report

Descriptors: *Statistical distributions, Theory.

AD-407 409 Div. 15, 26
(TISTP/JEA) OTS price $1.60

Florida State U., Tallahassee.
ADDITIONAL TABLES FOR THE SEQUENTIAL GROUPED RAND-SUM TEST,
by Saria D. Merchant and Ralph A. Bradley.
Aug 62, 9p. TR5
Contract Nonr98808, Proj. NR042 004
Unclassified report

Report on the Development of Statistical Methods for Quality Control and Surveillance Testing.

Descriptors: *Sequential analysis, *Quality control, *Statistical tests, Groups (Mathematics), Reliability, Tests, Probability, Tables, Sampling.

AD-407 547 Div. 15, 4
(TISTP/AW) OTS price $1.60

RAND Corp., Santa Monica, Calif.
THE LINEAR-LOGARITHMIC PROGRAMMING PROBLEM,
by R. J. Clasen. June 63, 11p. Memo. RM3707PR
Contract AF49 638 700
Unclassified report

Descriptors: *Programming (Computers), *Mathematical models, *Linear programming, Numerical analysis, Partial differential equations, Medicine, Biology, Chemical equilibrium.

The algebraic solution of the linear-logarithmic programming problem is developed, derived by means of Lagrange multipliers. Then, two numerical methods for solving the problem are given, one of which is a generalization of a method previously used to solve the chemical equilibrium problem. Convergence was not proven for either of these methods; however, a number of large chemical equilibrium problems were solved using one or both of the methods. (Author)

16. MEDICAL SCIENCES

AD-406 801 Div. 16
(TISTB/AAR) OTS price $1.10

Pittsburgh U. Graduate School of Public Health, Pa.
A CYTOGENETIC STUDY OF SOME RADIUM DIAL-PAINTERS AND THEIR PROGENY,
by Niel Wald, Charles E. Miller, Wayne H. Borges, Jip Kim, and Allen Brodsky. Apr 63, 7p.
Contract AF41 657 361, Task 775703
SAM TDR63 1 Unclassified report

Descriptors: *Genetics, *Radiation effects, Radium, Chromosomes, Bone, Anomalies, Radiobiology, Hematology, Paints.

Preliminary cytogenetic analyses were performed on four radium dial-painters and the crude average exposure dose to their bone marrow was estimated. Two instances of increased aneuploidy and three of increased chromosomal aberrations were observed in the four subjects, who had cumulative average bone marrow doses of 800 to 1,400 rem obtained at an average dose rate of 20 to 35 rem a year. Cytogenetic analyses were also performed in the progeny of four dial-painters, selected because of a history of frequent miscarriages and congenital anomalies. Among these were three instances of definite congenital anomaly. Increased aneuploidy was observed in all three patients. Additional observations and increased knowledge about the dosimetric and cytogenetic methods used are necessary before these preliminary findings can be adequately interpreted. (Author)

AD-406 857 Div. 16
(TISTM/AAR) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
ESOPHAGEAL COOLING AS A TECHNIC OF SELECTIVE BRAIN HYPOTHERMIA,
by James E. Dunn and Lester F. Williams, Jr. Apr 63, 7p.
Proj. 7759
SAM TDR63 19 Unclassified report

Descriptors: *Fevers, *Brain, Cooling, Esophagus, Dogs, Carbon dioxide, Respiration, Therapy.

An experiment using 17 mongrel dogs was performed comparing the production of selective brain hypothermia by esophageal cooling alone and with external neck cooling. A second experiment on 4 of these dogs, using the latter technic, compared the effects of increased carbon dioxide inhalation and bilateral vertebral artery ligation on the production of selective hypothermia. Although selective brain hypothermia was achieved in all animals to varying degrees, it was not of a sufficient magnitude to be recommended for clinical use. The clinical and pathologic changes are described. (Author)

AD-406 858 Div. 16
(TISTB/WA) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
SERUM LIPID AND LIPOPROTEIN CONCENTRATIONS IN MILITARY ACADEMY GRADUATES-TRENDS FROM 1952 THROUGH 1960,
by Margaret F. Allen and Dale A. Clark. Apr 63, 7p.
Task 775301
SAM TDR63 28 Unclassified report

Descriptors: *Blood serum, Cholesterol, Lipoproteins, Lipids, Body weight, Military personnel, Phospholipids, Biochemistry, Medical research, Chemical properties.

Biennial measurements of serum cholesterol, phospholipid, low and high density lipoprotein concentrations, and body weight are recorded for a group of more than 400 men who have been followed from average age 19.6 through 27.5 years. In general, serum lipid and low density lipoprotein concentrations increased between 1952 and 1958, and either remained unchanged or decreased slightly between 1958 and 1960. The high density lipoprotein concentration decreased in each sample year since first measured in 1956. (Author)

AD-406 886 Div. 16
(TISTB/DGH) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EFFECTS OF COLD ACCLIMATIZATION ON LIVER DI- AND TRIPHOSPHOPYRIDINE NUCLEOTIDE,
by John P. Hannon and Arthur Rosenthal. Jan 63, 7p.
Proj. 8237 02
AAL TDR62 40 Unclassified report

Descriptors: *Nucleotides, *Rats, *Exposure, Oxidoreductases, Cytochrome oxidase, Liver, Ph, Phosphorylation, Tissues, (Biology), Measurement, Acclimatization.

The levels of oxidized and reduced di- and triphosphopyridine nucleotide were measured in liver tissue from rats that had been exposed to cold (4 ± 1 C) for one month. These animals exhibited about 65% more TPNH and total triphosphopyridine nucleotide than control animals maintained at an ambient temperature of 25 ± 1 C. The significance of these alterations to the efficiency of oxidative phosphorylation is discussed. (Author)

AD-406 887 Div. 16
(TISTM/SAT) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
ARCTIC SURVIVAL RATIONS. X. DIURNAL VARIATIONS OF SOME LIVER CONSTITUENTS IN RATS FED PEMMICAN MEALS,
by D. A. Vaughan and R. L. Winders. Mar 63, 8p.
Proj. 8238 03
AAL TDR 62 54 Unclassified report

Descriptors: *Carbohydrates, *Liver, Glycogen, Enzymes, Rats, Phosphoric monoester hydrolases, Transferases, Diet, Tissue extracts.

Diurnal variations in liver glycogen content and the activities of certain liver enzymes following 2-hour feeding periods were studied in trained-fed rats adapted to high-carbohydrate or carbohydrate-free diets. The results indicated that time after feeding a high-carbohydrate meal affected the activities of glucose-6-phosphatase

and glutamic-pyruvic transaminase, but not glucose-6-phosphate dehydrogenase. These time-related changes were modified by meal-feeding the carbohydrate-free diet. Glycogen deposition following a carbohydrate-free meal indicated a rapid takeover of gluconeogenesis. (Author)

AD-406 908 Div. 16
(TISTB/WA) OTS price $1.00

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
ACTIVATION AND SUPPRESSION OF SHIVERING DURING SEPTAL AND HYPOTHALAMIC STIMULATION,
by D. G. Stuart, Y. Kawamura and A. Hemingway.
Sep 62, 36p.
Contract AF41 657 344, Proj. 8238 22
AAL TDR62 16 Unclassified report

Descriptors: *Brain, *Shivering, Hypothermia, Nervous system, Cats, Electrodes, Histology, Thalamus, Anesthetics, Medical research, Stimulation.

In acute experiments on 38 lightly anesthetized cats, the septal region of the forebrain and the hypothalamus were explored for loci whose activation by electrical stimulation produced, suppressed or failed to affect shivering. Shivering was consistently and repeatedly produced by stimulation of the dorso-medial region of the posterior hypothalamus, and sometimes by stimulation of the ventrolateral region of the septum. A greater intensity of stimulus was needed to produce more latent and less intense shivering during septal than during hypothalamic stimulation. Similarly, more intense stimulation was necessary to suppress shivering during ventromedial septal stimulation than during anterior, or ventrolateral posterior hypothalamic stimulation. The most effective stimulation frequency for both activation and suppression of shivering was 50 pulses/sec, i.e. fivefold the evoked or suppressed limb tremor frequency. On the basis of these results it was concluded that septal influences on shivering are secondary to a primary hypothalamic modulation of this tremor. Such modulation appears to be more concerned with initiation and maintenance than with the rhythm of shivering. (Author)

AD-406 909 Div. 16, 30
(TISTB/WA) OTS price $1.60

System Development Corp., Santa Monica, Calif.
CODING CLINICAL LABORATORY DATA FOR AUTOMATIC STORAGE AND RETRIEVAL,
by Leonard D. Gross. 9 May 63, 13p. SP1120
Unclassified report

Descriptors: *Data processing systems, *Information retrieval, *Medical research, Computer storage devices, Simulation, Punched cards, Reports, Hematology, Urinary system, Blood chemistry, Automation, Programming (Computers).

A series of clinical laboratory codes were developed to accept and store Urinalysis, Blood Chemistry, and Hematology test results for automatic data processing. The codes, although constructed as part of a computerized hospital simulation, have been able to handle the results of every laboratory test that they have encountered. The unique feature of these codes is that they can accept conventionally recorded qualitative as well as quantitative test results. Consequently, clinical test results need not be arbitrarily stratified, standardized, or altered in any way to be coded. This paper describes how the codes were developed and presents a listing of the Urinalysis codes. Five criteria used in developing the codes are outlined and the problem of multiple-synonymous terminology is discussed. A solution to the problem is described. Flexible, computer-produced, composite laboratory reports are also discussed, along with reproduction of such a report. (Author)

AD-406 910 Div. 16, 30
(TISTM/AAR) OTS price $1.60

Systems Development Corp., Santa Monica, Calif.
STIMULUS SAMPLING PATTERN RECOGNITION,
by Frank N. Marzocco. 15 Mar 63, 9p.
SP986 000 01
Unclassified report

Descriptors: *Pattern recognition, *Behavior, *Sampling, Discriminators, Stimulation, Bionics, Computers, Simulation, Theory.

A generalized computer model was constructed to simulate the behavior of organisms according to various versions of stimulus sampling theory. Results already reported dealt with the learning behavior of rats in a T-maze. With the addition of new routines to specify the simulated environment of the simulated organism, a similar basic program has learned to discriminate among visual patterns consisting of carelessly hand-drawn alphabetic characters, each of which is presented in a number of variations. Input to the program is a binary representation of the presence or absence of parts of the figure in a 20 x 20 matrix superimposed on the figure to be recognized. Each cell of the matrix is treated as a separate stimulus having various numbers of elements associated with all the responses that can be made. A random sample of elements from stimuli present in the visual field is used to determine the response on any trial. When a correct response is made, all elements sampled on that trial become associated with that response. Changes in learning rates occur as the probability of selecting available stimulus elements is changed. (Author)

AD-406 915 Div. 16
(TISTB/WA) OTS price $1.10

Washington U., Seattle, School of Medicine.
(No title).
Final scientific rept. for period covering 1 May 52-31 Oct 62,
by T. C. Ruch. 12 June 63, 4p.
Contract Nonr47707, Proj. NR113 150
Unclassified report

Descriptors: *Brain, *Neurology, Primates, Bibliographies, Medical research, Gastrointestinal system, Reaction (Psychology).

AD-406 934 Div. 16
(TISTB/AAR) OTS price $1.60

Baylor U. Coll. of Medicine, Houston, Tex.
THE CIRCULATORY EFFECTS OF A HOMOLOGOUS PLASMA-BLOOD EXCHANGE IN THE DOG.
Annual progress rept., 1 Oct 62-1 June 63,
by Russell A. Huggins and Stephanie Deavers.
1 June 63, 15p.
Contract DA49 193md2357
Unclassified report

Division 16 - MEDICAL SCIENCES

Report on Fluid and Protein Shift with Hemorrhage and with Overtransfusion. In cooperation with Texas U., Dental Branch, Houston.

Descriptors: *Blood transfusions, Proteins, Fluids, Hemorrhage, Erythrocytes, Blood volume, Blood plasma, Blood pressure, Dogs.

Rept. for 1 Feb-30 Apr 61,
by David Rapport. Oct 61, 12p.
AAL TN61 6 Unclassified report

Descriptors: *Fatty acids, Rats, Liver, Tracer studies, Enzymes, Vitamin A, Adenosine phosphates, Microsomes, Brain, Diet, Coenzymes, Hypothermia, Blood, Metabolism.

AD-407 000 Div. 16
(TISTB/CCH) OTS price $2.25

General Electric Co., Philadelphia, Pa.
RESEARCH OF ELECTROLYSIS CELL-FUEL CELL METHOD OF RECOVERING POTABLE WATER FROM URINE (PROJECT ELF) Final rept.,
by William H. Toliver, Sr. Apr 63, 84p.
Contract AF33 657 7667, Proj. 6373, Task 637304
AMRL TDR63 32 Unclassified report

Report on Equipment for Life Support in Aerospace.

Descriptors: *Water, *Urine, Fuel cells, Acceptability, Life support, Space medicine, Recovery, Electrolysis.

A program of study and applied research was conducted to determine the feasibility of combining an ion exchange membrane electrolysis cell and an ion exchange membrane fuel cell so that oxygen and hydrogen which are electrolyzed from human urine recombine in the fuel cell to yield potable water and power. The latter, in turn, will satisfy some of the power requirements of the electrolysis cell. The experimental laboratory systems were synthesized from latest ion-exchange membrane technology, and produced water that is both chemically and bacteriologically well within limits of the 1961 U.S. Public Health Standards for Drinking Water. The system has high yield (98% of available water content), long operating life (37 days plus), and produces usable low-voltage electrical power. The electrolysis cell output also provides for a high-purity (to 99.5%) emergency oxygen capability. The design is basically a zero-G type, inherently providing separation of vapor and liquid. Trade-off evaluations indicate that the ELF System is competitive with other water-recovery systems presently being developed for space applications. Characteristic features of a three-man system are: weight 67 pounds; volume, 1.6 cubic feet; and power consumption, 650 watts for continuous operation. The flexibility, reliability, and overall simplicity of the ELF system make this water recovery technique a strong contender for future space applications. (Author)

AD-407 012 Div. 16
(TISTB/AAR) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD.

AD-407 014 Div. 16
(TISTB/AAR) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
MECHANISM OF ADAPTATION TO A TREONINE-DEFICIENT DIET. IV. EFFECT OF AGE AND WEIGHT ON THREONINE DEFICIENCY SYMPTOMS IN THE RAT,
by Dorothy Arata. Oct 61, 3p.
AAL TN61 2 Unclassified report

Descriptors: *Diet, Aging, Weight, Rats, Liver, Fat, Blood, Amino acid.

When weanling rats are fed a threonine-deficient diet, fat deposits in the livers reach a maximum in approximately 2 weeks. This phase is followed by a period of recovery wherein the concentration of fat is slowly decreased. Livers from all rats fed casein diets deficient in threonine had significantly greater concentrations of fat than did the control animals. These differences were significant at the 1% level regardless of the length of the ''pre-experimental feeding trial.'' However, the absolute amount of fat deposited in livers from rats fed a threonine-deficient diet decreased as the length of the pellet-feeding phase increased. The same trend, though on a much smaller scale, was observed in the control rats. (Author)

AD-407 015 Div. 16
(TISTB/AAR) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
MECHANISM OF ADAPTATION TO A THREONINE-DEFICIENT DIET. V. EFFECT OF QUANTITY OF SUCROSE AND CELLULOSE ON THE SEVERITY OF THREONINE DEFICIENCY,
by Dorothy Arata. Oct 61, 6p.
AAL TN61 3 Unclassified report

Descriptors: *Diet, Fat, Liver, Rats, Casein, Blood, Weight, Cellulose, Sucrose, Amino acids.

A significant difference in liver fat levels was observed. However, when one-half of the sucrose in these diets is replaced with alphacel liver fat levels are significantly reduced in both the control groups and the threonine-deficient groups. Moreover, the severity of the fatty liver syndrome in rats fed a threonine-deficient diet containing alphacel is markedly reduced. Livers from threonine-deficient rats fed alphacel had liver fat levels only slightly deviated from their controls. No significant differences were observed in liver weights between any of the four groups. Weight and food records are presented. No significant differences were recroded in any of the measurements. (Author)

AD-407 016 Div. 16
(TISTB/AAR) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CARDIOVASCULAR EFFECTS OF REFEEDING STRESS FOLLOWING STARVATION. PART XI. EFFECTS OF LONG-TERM STARVATION-REFEEDING EPISODES,
by G. S. Smith and B. Connor Johnson. Sep 61, 10p.
AAL TN61 1 Unclassified report

Descriptors: *Stress, *Cardiovascular system, Diet, Swine, Glucose, Fats, Starvation.

The research project was undertaken to determine what, if any, are the principal factors in the diet which may induce and/or aggravate cardiovascular stress during refeeding following starvation. This report is concerned with the responses of young adult swine to a second long-term starvation episode and refeeding, initially with either pure glucose or pure corn oil and subsequently with diets high in content of either glucose or corn oil. (Author)

AD-407 017 Div. 16
(TISTB/AAR) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD.
Rept., 1 Nov 60-31 Jan 61,
by David Rapport. Oct 61, 11p.
AAL TN61 5 Unclassified report

Descriptors: *Fatty acids, Inhibition, Temperature, Microsomes, Liver, Cells, Chromatographic analysis, Colloids, Heat, Enzymes, Adenosine phosphates, Rats, Distribution, Fat, Diet, Hypothermia, Metabolism.

In 1961 evidence was presented for the fact that the microsomes of the liver from animals fasting at 25 degrees C or 0 degrees to 2 degrees C are inhibitory to the lipogenic activity of the liver cell. It was further shown that sonic treatment of these microsomes liberated, in a water soluble form, an inhibitory material which mimicked that of the microsomes from these cells. Chromatography of Sephadex G25 indicated that this inhibitory material was of a colloidal nature. For this reason it was decided to investigate further the colloidal nature of this substance by the process of dialysis. It can be seen that this microsomal inhibitor of lipogenesis is non-dialyzable and presumably, therefore, is either a colloid or a substance tightly bound to a colloid. (Author)

AD-407 018 Div. 16
(TISTB/AAR) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EFFECTS OF DECEREBRATION AND DECORTICATION ON SHIVERING IN THE CAT,
by D. G. Stuart, W. J. Freeman, and A. Hemingway. Sep 62, 17p.
Contract AF41 657 344, Proj. 8238 22
AAL TDR62 15 Unclassified report

Descriptors: *Shivering, Metabolism, Intensity, Inhibition, Cats, Oxygen consumption, Brain, Control.

The effects of decerebration and decortication on the metabolic intensity of shivering in cats were determined. There was neither shivering nor an appreciable rise in the oxygen consumption rate of chronic decerebrate cats during rapid cooling. The intermittent somatomotor activity that was induced by rapid cooling was occasionally tremulous but it was also evoked by rapid warming and was absent during slow cooling and warming. This suggested that the motor activity of decerebrate cats during rapid cooling was more a generalized avoidance response to nociceptive stimulation than a temperature regulating mechanism. In decorticate cats shivering was depressed three days after surgery, the mean shivering to nonshivering ratio in oxygen consumption rate being 1.6 ± 0.12 (S.D.), while the same ratio before operation was 2.6 ± 0.48 (S.D.). One month after decortication shivering had returned to its pre-operative intensity. This suggested that the net telencephalic influences on shivering could hardly be suppressive, as suggested by some earlier investigators. (Author)

AD-407 037 Div. 16
(TISTM/AAR) OTS price $1.60

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
ELBOW, 2-1/2 INCH SIZE WITH HALF CYCLE ALTERNATOR,
by T. J. Bushey and V. T. Riblett. May 63, 9p.
Proj. 6X59 01 001 04
APRL TR6306 Unclassified report

Descriptors: *Prosthetics, Effectiveness, Design, Joints, Arms.

An elbow 2-1/2 in. size with half cycle alternator was designed and developed for use by very short above elbow, shoulder disarticulation and forequarter amputees. The elbow provides the amputee with a means of positively locking the forearm with respect to the arm in 13 separate positions of flexion from the fully extended to the fully flexed position of approximately 5 degrees to 140 degrees. The locking mechanism can be engaged or disengaged with the same control motion. Flexion and operation of the terminal device is accomplished by energy transferred from the harness through a cable system to the elbow unit and terminal device. Forearm rotation is permitted between the top portion of the elbow unit and the turntable to which the upper arm shell is fastened. The amount of resistance to rotation is determined by the tension maintained to the attaching bolts. (Author)

AD-407 043 Div. 16
(TISTB/WA) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
MAINTAINING THE THERMAL BALANCE IN MAN,
by L. D. Carlson. Jan 63, 15p.
Proj. 8237 01
AAL TDR62 24 Unclassified report

In cooperation with Kentucky U., Lexington,
Contract AF41 657 335.

Descriptors: *Heat production, *Body temperature, Physiology, Skin, Sweat cooling, Cooling, Nervous system, Blood vessels, Blood circulation, Temperature control, Man.

This report briefly characterizes the heat production of the human and the heat exchange with the environment. The mechanisms whereby the temperature control system operates are presented. These characteristics are schematically shown in fourteen figures. (Author)

Division 16 - MEDICAL SCIENCES

AD-407 060 Div. 16
(TISTB/AAR) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EFFECTS OF SEPTAL AND HYPOTHALAMIC LESIONS ON SHIVERING,
by D. G. Stuart, Y. Kawamura, A. Hemingway, and W. M. Price. Sep 62, 14p.
Contract AF41 657 344, Proj. 8238 22
AAL TDR62 18 Unclassified report

Descriptors: *Shivering, Cats, Thalamus, Wounds & injuries, Behavior, Reaction, Brain, Control.

Shivering and heat loss in the cold were determined in 46 cats several weeks or months after bilateral destruction of various septal and hypothalamic regions. Septal lesions had no effect on either parameter. The tremor was abolished or markedly reduced in cats with lesions in the dorsomedial region of the posterior hypothalamus, but postural, pilomotor and behavioral responses to cooling persisted. Lesions of the dorsolateral region of the posterior hypothalamus increased heat loss despite the presence of shivering, huddling and piloerection. These results confirmed our previous electrical stimulation data that the primary region controlling the efferent (motor) aspect of shivering is the dorsomedial region of the posterior hypothalamus and additionally indirectly suggested that the dorsolateral region of the posterior hypothalamus is implicated in cold-induced cutaneous vasoconstriction. (Author)

AD-407 061 Div. 16
(TISTB/CCH) OTS price $1.10

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
FABRICATION OF A POROUS POLYESTER DOUBLE-WALL, BELOW-ELBOW PROSTHESIS, TWO-STEP METHOD,
by James T. Hill. May 63, 7p.
APRL TR6305 Unclassified report

Descriptors: *Prosthetics, *Esters, Arm, Polymerization, Porous material, Design, Manufacturing methods, Artificial limbs.

Methods for preparing porous epoxy prostheses were described. A technique for preparing porous polyester prosthesis was developed. This technique, although similar to the epoxy method, is sufficiently different to warrant a separate report. This report describes a two-step method for preparing porous polyester prostheses. (Author)

AD-407 091 Div. 16
(TISTB/AAR) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
ANATOMY OF THE HYPOTHALAMUS AND ITS CONNECTIONS,
by D. G. Stuart. Sep 62, 20p.
Contract AF41 657 344, Proj. 8238 22
AAL TDR 62 13 Unclassified report

Descriptors: *Thalamus, *Brain, Shivering, Control, Tissues, Cells, Anatomy.

This report briefly summarizes hypothalamic anatomy in terms of boundaries, cellular groups, intra, efferent and afferent connections, and ontogenetic development. Wherever possible, discussion is directed or limited to aspects of hypothalamic anatomy that are of special significance to the nervous control of shivering. For this reason the connections between the septal area of the forebrain and the hypothalamus are emphasized. (Author)

AD-407 097 Div. 16
(TISTB/AAR) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EFFECTS OF ANTI- AND PSEUDO-PARKINSON DRUGS ON SHIVERING,
by D. G. Stuart, R. George, W. J. Freeman, A. Hemingway and W. M. Price. Sep 62, 11p.
Contract AF41 657 344, Proj. 8238 22
AAL TDR62 17 Unclassified report

Descriptors: *Parasympatholytic agent, Reserpine, Shivering, Intensity, Oxygen consumption, Inhibition, Cats, Atropine.

Effects of atropine, an anti-Parkinson agent, and reserpine, a pseudo-Parkinson agent, on the intensity of shivering in cats were determined. This intensity was measured by the ratio of shivering oxygen consumption rate (VO2) to resting VO2. At a dose level (5 mg/kg I.P.) in excess of that necessary to suppress Parkinson or experimentally-induced alternating tremor, atropine sulphate had no effect on the intensity of cold-induced shivering. At a dose level of 0.5 mg/kg I.V., reserpine suppressed shivering but evoked an alternating tremor with Parkinson characteristics. (Author)

AD-407 137 Div. 16
(TISTB/CCH) OTS price $1.50

Ionics, Inc., Cambridge, Mass.
THE RECOVERY OF WATER FROM URINE BY MEMBRANE ELECTRODIALYSIS.
Final rept.,
by Daniel L. Brown, Robert W. Lindstrom, and J. Douglas Smith. Apr 63, 50p.
Contract AF33 657 7710, Proj. 6373, Task 637304
AMRL TDR63 30 Unclassified report

Report on Equipment for Life Support in Aerospace.

Descriptors: *Water, *Urine, Membrane (Physiology), Electrolytes, Chemical reactions, Oxidation, Reliability, Hydrolysis, Carbon, Absorption, Regeneration, Ammonium compounds, Carbonates, Life support, Space medicine, Recovery, Electrodialysis.

A laboratory-scale experimental program was conducted which clearly indicated the feasibility of membrane electrodialysis for recovering potable water from urine. Since electrodialysis removes electrolytes from urine, pretreatment techniques were investigated for the removal of nonelectrolytes. These techniques were: charcoal adsorption, chemical oxidation, and enzymatic hydrolysis of urea to ammonium carbonate. A model of a urine reclamation system was built, comprised of two main processes: charcoal adsorption and electrodialysis. The system weighs 15 pounds, is less than one ft3 in size, and has a peak power requirement of 45 watts for 8 hours operation for the daily recovery of 3000 ml of potable water from urine. The daily energy requirement is 310 watt-hrs, including 160 watt-hrs for charcoal regeneration. Excellent quality water is recovered in yields of 92%. (Author)

AD-407 147 Div. 16
(TISTB/CCH) OTS price $1.60

System Development Corp., Santa Monica, Calif.
LABORATORY CODES DEVELOPED FOR THE SIMULATED HOSPITAL EXPERIMENT,
by Leonard D. Gross. 21 May 63, 11p. SP1120 001 00
Unclassified report

Descriptors: *Hospital, *Information retrieval, *Medical laboratories, Hematology, Blood chemistry, Urine, Coding, Simulation, Medical research.

This document contains the Urinalysis, Hematology, and Blood Chemistry codes developed for the Simulated Ward Experiment. The document was produced as an appendix to SP-1120. SP-1120 describes how the codes were developed and discusses their potential utilization. (Author)

AD-407 256 Div. 16, 14
(TISTB/SAT) OTS price $1.60

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
THE DEVELOPMENT OF A DYNAMIC ARCH SUPPORT,
by John J. Urban. May 63, 11p.
Proj. 6X59 01 001 04
APRL TR6308 Unclassified report

Descriptors: *Shoes, Silicon compounds, Anthropometry, Foam rubber, Rubber, Supports.

Materials and methods were developed for the fabrication of dynamic arch supports. The outstanding characteristics of the new material are its quick setting attributes along with the flexible means for setting time adjustment and material consistency which permits immediate corrective possibilities. (Author)

AD-407 298 Div. 16, 20
(TISTB/AAR) OTS price $7.60

Southwest Research Inst., San Antonio, Tex.
STUDY OF FREE RADICALS IN IRRADIATED BEEF.
Rept. no. 7 (Final) 30 Dec 60-29 Dec 62.
29 Dec 62, 75p. S 608
Contract DA19 129qm1740
Unclassified report

Descriptors: *Beef, *Food, Free radicals, Odors, Radiation damage, Proteins, Amino acids, Preservation.

A description of the mechanism by which wet dog hair odor is induced in cooked beef by radiation is described. The investigation was largely of the non-dialyzable fraction of aqueous extract of cooked beef, prepared according to Paul A. Hedin and his group at QMF&CI. Electron spin resonance was the principal method employed. Although the results do not afford a substantial basis for conclusions, the electron spin resonance data from this program, together with data from other investigators, suggest that glycine and methionine units in the protein, either bonded to one another or as close neighbors, make up a major source of wet dog hair odorants through a reaction involving a radiation-induced free radical and water. (Author)

AD-407 391 Div. 16
(TISTB/CCH) OTS price $2.40

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
SEPTAL AND HYPOTHALAMIC STIMULATION OF UNANESTHETIZED CATS,
by D. G. Stuart, Y. Kawamura, and A. Hemingway.
Sep 62, 21p.
Contract AF41 657 344, Proj. 8238 22
AAL TDR62 14 Unclassified report

Descriptors: *Brain, *Thalmus, Cat, Shivering, Electric potential, Nervous system, Behavior, Steel, Electrodes, Autonomic nervous system, Anesthesia, Stimulation.

AD-407 407 Div. 16
(TISTB/AAR) OTS price $1.10

Albany Medical Coll., N. Y.
URINE TITRATABLE ACIDITY AND AMMONIA EXCRETION DURING HYPOTHERMIA,
by G. S. Kanter. Apr 63, 5p.
Contract AF41 657 393
SAM TDR63 8
Unclassified report

Descriptors: *Urine, Excretion, Hydrogen, Ions, Secretion, Dogs, Kidneys, Acidosis, Volumetric analysis, Ammonia, Anesthetics, PH, Hypothermia.

Hydrogen ion secretion by the kidneys of anesthetized hypothermic dogs was measured to ascertain if the hypothermic kidney helps to compensate for the acidosis which develops during exposure to cold. Artificial respiration was not used. Total hydrogen ion excretion was measured as the sum of total titratable acid and ammonia excreted. Though anaerobic arterial pH, corrected to body temperature, fell significantly from 7.41 during control to 7.27 at 27 degrees C., urinary pH remained at control levels of approximately 6.8. Neither titratable acid nor ammonia excretion increased in response to the hypothermic acidosis as would have occurred during normothermia with a similar low pH. Total titratable acid excretion fell from a control value of 0.011 mEq./min. to 0.005 mEq./min. at 27 degrees C. Ammonia excretion, after a mild increase from a control value of 0.008 mEq./min., fell to 0.006 mEq./min. at 27 degrees C. (Author)

AD-407 411 Div. 16
(TISTB/AAR) OTS price $3.60

California U., Davis.
STUDIES ON PHYSICAL AND CHEMICAL MODIFICATION OF PROTEINS FOR THE PREVENTION OF IRRADIATION OFF-FLAVORS IN MEAT.
Rept. no. 16 (Final), 15 May 58-14 Sep 62,
by A. L. Tappel, F. Shimazu, U. S. Kumta, K. S. Ambe, and R. J. Romani. 14 Sep 62, 34p.
S520
Contract DA19 129qm1172, Proj. 7X84 01 002
Unclassified report

Descriptors: *Food, *Meat, Proteins, Amino acids, Radioprotective agents, Hemoglobin, Sensitivity, Sulfur compounds, Gamma rays, Odors, Preservation, Radiation damage.

Radiation damage to ovalbumin, hemoglobin and cytochrome c has been studied under anaerobic condition and the degradation mechanisms are discussed. The radio-lability of free amino acids was determined and evaluation methods for the radio-lability are discussed. The radio-lability of amino acids as free amino acids or bound in peptide linkage in protein is also discussed. The radio-lability of methionine and its derivatives were studied and the degradation mechanisms are discussed. Decrease of radiation damage to ovalbumin, hemoglobin and cytochrome c by cystine, AET and MEA was studied and their protection mechanisms are discussed. Decrease of radiation damage to some of the typical amino acids by methionine was studied and their mechanisms are discussed. (Author)

AD-407 412 Div. 16
(TISTB/AAR) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
ALTERATIONS OF PROTEIN METABOLISM DURING COLD ACCLIMATION,
by G. J. Klain and D. A. Vaughan. Jan 63, 15p.
Proj. 8238 03
AAL TDR62 60
Unclassified report

Descriptors: *Proteins, *Exposure, Hypothermia, Rats, Heat, Temperature, Oxidation, Carbohydrates, Fats, Diet, Weight, Liver, Kidneys, Amino acids, Enzymes, Metabolism, Acclimatization.

The changes in the protein metabolism in animals exposed to cold are discussed. Work of the authors showed that a moderate cold exposure is an effective agent in correcting and overcoming amino acid imbalances in the rat, and that both substrate-induced and cold-induced enzymatic changes occur in cold-exposed animals. (Author)

AD-407 423 Div. 16
(TISTB/CCH) OTS price $1.00

Spacelabs, Inc., Van Nuys, Calif.
METHOD OF PRESERVING FROZEN FOOD DURING AN AEROSPACE MISSION.
Final rept.,
by Robert R. Reddy and Eugene B. Zwick. Apr 63, 31p.
Contract AF33 657 8019, Proj. 6373, Task 637303
AMRL TDR63 31
Unclassified report

Descriptors: *Frozen food, Test methods, Space flight, Astronautics, Refrigerants, Radiation effects, Cooling, Preservation.

Analyses of three nonelectrical methods for maintaining frozen foods between -10 F and +5 F during aerospace missions of 1 to 28 days are presented. The methods considered are: (1) a heat sink, (2) active refrigeration, and (3) radiation cooling. All method appear feasible. The heat sink method appears to be the simplest and most reliable. A design study of a heat sink system for a 3-man, 14-day mission is included. (Author)

AD-407 454 Div. 16
(TISTB/CCH) OTS price $3.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
LEVER DISPLACEMENT DURING A DISCRIMINATION-DIFFERENTIATION,
by Robert M. Herrick. 8 Apr 63, 27p.
NADC MA6303; NAVMED Rept. no. 10
Unclassified report

Descriptors: *Acceleration, *Psychomotor tests, Rats, Mathematical analysis, Motor reactions.

The maximum displacement of the T-bar handle of a rat response lever was recorded under two schedules: (a) programmed variable-duration S to the exponent and S to the exponent delta periods with reinforcement only for S to the exponent presses between 23.54 degrees and 28.64 degrees (Position 5) and (b) the same requirements for a reinforcement as in (a) but with S to the exponent delta initiated only by a ''wrong'' press in S to the exponent, and prolonged by any press in S to the exponent delta. With this lever, work is linearly proportional to displacement. Under the first schedule (a) S to the exponent distributions differed significantly from their companion S to the exponent distributions, although the lever position showing the greatest percentage of presses in S to the exponent often corresponded with the one showing the greatest percentage in S to the exponent delta and (b) both mean lever displacement and variability were consistently greater in S to the exponent delta than in S to the exponent. Under the second schedule (a) S to the exponent distributions differed significantly from their companion S to the exponent delta distributions, but the S to the exponent - S to the exponent delta distributions were positively correlated and (b) mean lever displacement was about the same in S to the exponent and S to the exponent delta, but variability was consistently greater in S to the exponent delta. (Author)

AD-407 518 Div. 16
(TISTB/WA) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
QUANTITATIVE DETERMINATION OF SOME CONSTITUENT LIPIDS IN HUMAN DENTIN,
by Thomas R. Dirksen and Kenneth G. Ikels.
Nov 62, 4p.
SAM/B TDR62 120
Unclassified report

Descriptors: *Teeth, *Lipids, Dentistry, Medical research, Calcification, Chromatographic analysis, Chemical properties, Cholesteral.

A method is described for the extraction of dentin lipids and the separation of these lipids into six components (cholesterol esters, free cholesterol, triglycerides, diglycerides, monoglycerides, and phospholipids). Essentially, the method requires the decalcification of dentin using EDTA and subsequent extraction with diethyl ether, ethanol, and chloroform. The lipid extract is separated into six components by a small silicic acid column and the effluents are quantitated colorimetrically. (Author)

AD-407 570 Div. 16
(TISTB/CCH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
STRESS IN DENTAL PATIENTS. EFFECT OF LOCAL ANESTHETIC PROCEDURES,
by I. L. Shannon and G. M. Isbell. May 63, 4p.
Task 775602
SAM TDR63 29 Unclassified report

Descriptors: *Stress (Psychology), *Dentistry, Man, Anesthesia, Test methods.

The serum free 17-OHCS response to local anesthetic procedures was evaluated in 258 systemically healthy young adult males. Subjects were not informed of their impending participation.

Three groups of subjects were injected with different solutions, a fourth group underwent needle insertion with no injection, and a final sham group was taken through the anesthetic procedure without needle insertion. Preoperative serum free 17-OHCS means did not differ for the five groups. The increase in postinjection 17-OHCS levels was highly significant ($P < .001$) for all groups but not significantly different between the five groups. Thus, psychologic factors are of primary importance in the adrenocortical hyperactivity associated with intraoral injections. (Author)

AD-407 681 Div. 16
(TISTB/CCH) OTS price $1.60

Oslo U. (Norway).
FUNCTIONAL SIGNIFICANCE OF LIMBIC, CEREBRAL CORTICAL AND CEREBELLAR STRUCTURES
Final rept.
14 Mar 63, 1v.
Contract AF EOAR62 36
AFOSR 4704 Unclassified report

Descriptors: *Cerebral cortex, *Brain, Electric potential, Urinary system, Reproduction system, Sex glands, Learning, Stimulation, Motor reactions.

17. METALLURGY

AD-406 872 Div. 17
(TISTM/BRW) OTS price $3.50

Nuclear Metals Inc., Concord, Mass.
BERYLLIUM RESEARCH AND DEVELOPMENT PROGRAM.
Rept. for 1 Apr 60-30 Sep 61,
by S. H. Gelles. Apr 63, 207p.
Contract AF33 616 7065, Proj. 7351, Task 735104
ASD TDR62 509, vol. 2 Unclassified report

Report on Metallic Materials.

Descriptors: *Beryllium, Preparation, Purification, Distillation, Welding, Brazing, Forging, Ultrasonic radiation, Resistance welding, Heat treatment, Aging (Materials), Mechanical properties, Chemical analysis, Spectroscopy, Fracture (Mechanics), Impurities, Metallurgy.

The report summarizes the work to make beryllium more useful as an Air Force structural material. The program was divided into eleven major efforts. Detailed abstracts of each program are presented. Two programs deal with the purification and evaluation of purified beryllium. In this effort it was found that high purity beryllium could be produced by a vacuum distillation process. Preparation of pure metal by decomposition of the iodide did not appear to be feasible. Four programs deal with the joining of beryllium. The feasibility of joining beryllium by ultrasonic welding was shown. The resistance spot welding program led to definition of the welding parameters, and to methods of altering the weld nugget structure and of eliminating cracking and porosity. The application of warm working in the form of roll-planishing improved to some extent the mechanical behavior of welds made by the Tungsten-arc Inert Gas (TIG) process. In the brazing effort, the optimum time and temperature for brazing beryllium with silver was defined and the effects of post-braze heat treatment on the room temperature and elevated temperature mechanical properties were determined. The remaining programs deal with the flow and fracture characteristics of beryllium and the effect of impurities and alloying additions. (Author)

AD-406 873 Div. 17
(TISTM/BRW) OTS price $3.00

Chance Vought Corp., Dallas, Tex.
DEVELOPMENT OF A NICKEL BASE ALLOY SHEET FOR HIGH TEMPERATURE APPLICATION.
Final rept. 15 Mar 61-15 July 62,
by H. Greenewald, Jr. and T. J. Riley. Apr 63, 149p.
Contract AF33 616 7999, Proj. 7351, Task 735105
ASD TDR62 869 Unclassified report

Report on Metallic Materials.

Descriptors: *Nickel alloys, Sheets, Rolling mills, Tensile properties, Mechanical properties, Manufacturing methods, Heat treatment, Microstructure, Oxidation, Melting, Casting, Ductility, Metallography, Tantalum alloys, Carbon alloys, Molybdenum alloys, Chromium alloys, Tungsten alloys, Aluminum alloys, Titanium alloys, Zirconium alloys, High temperature research.

Effort was directed to develop 15 to 30 mil nickel alloy sheet with 50,000 psi tensile strength at 1900 F, good corrosion (oxidation) resistance, and good ductility. This objective was essentially attained by developing a new process of directly rolling thin cast slabs of nickel base alloy fnto sheet on a specially designed rigid rolling mill. Two pre-existing nickel base casting alloys and a series of experimental compositions obtained by modifying the two starting alloys were initially investigated in the cast condition in this program. The two starting alloy compositions were Inco 713c and the TaZ8 alloy. Of the new experimental compositions, TaZ8 alloy and No. 429 alloy have 1900 F tensile strengths exceeding 50,000 psi at 1900 F in the as cast condition. Inco 713c has a tensile strength of about 40,000 psi in the as cast condition. Procedures were developed on the rigid mill for hot rolling both Inco 713c and TaZ8 alloy into 15 to 30 mil sheet. Heat treatment procedures were developed for both alloys which enabled them to meet contract target strength properties. (Author)

AD-406 929 Div. 17
(TISTM/AMS) OTS price $2.60

Rensselaer Polytechnic Inst., Troy, N. Y.
MECHANICAL PROPERTIES OF TWO-PHASE CRYSTALLINE MATERIALS,
by G. S. Ansell. 22 May 63, 26p. TR3
Contract Nonr591 15, Proj. 031 689
Unclassified report

Paper to be presented at the International Symposium, High Temperature Technology, 8-11 Sep 63, Asilomar, Calif.

Descriptors: *Alloys, *Dispersion hardening, *Phase studies, Theory, Aluminum alloys, Steel, Deformation, Solids, Mechanical properties, Crystal lattice defects, Plasticity, Tensile properties, Mathematical model, Mathematical analysis, Temperature, Creep, Stresses, Grain structures (Metallurgy), Aluminum compounds, Oxides, Experimental data, Fractography, Symposia.

Division 17 - METALLURGY

AD-407 007 Div. 17
(TISTM/AMS) OTS price $1.60

United Aircraft Corp., East Hartford, Conn.
ANALYTICAL AND EXPERIMENTAL INVESTIGATIONS OF THE FRACTURE MECHANISMS OF CONTROLLED POLYPHASE ALLOYS.
Quarterly progress rept. no. 2, 30 Jan-29 Apr 63, by J. A. Ford and R. W. Hertzberg. 31 May 63, 18p. B910068 2
Contract N600 19 59361
Unclassified report

Descriptors: *Alloys, *Eutectics, Aluminum alloys, Copper alloys, Nickel alloys, Chromium alloys, Tensile properties, Shear stresses, Fracture (Mechanics), Fractography, Phase studies, Mechanical properties.

The results of continued investigations on selected unidirectionally solidified binary eutectic alloys are reported. Large grains were produced in the Al-CuAl2 eutectic ingots. Microbend specimens, whose length dimension made an angle of zero, thirty, forty-five, sixty, and ninety degrees to the lamellae orientation, were prepared and tests carried out for the zero and ninety degree orientations indicated average tensile strengths of 46,800 psi and 22,900 psi, respectively. The failure mechanism(s) are characterized by Al platelet plastic deformation and by CuAl2 platelet cleavage. Preliminary information on the effect of Cr whisker orientation on the fracture mechanism(s) of unidirectionally solidified Cu-Cr ingots has been obtained for the case of whiskers oriented at 45 degrees to the tensile load axis. The predominant failure mode was of the shear type. Also, the fracture mode of specimens solidified at high growth rates and tested parallel to the fiber orientation was determined to be controlled by Cr whisker failure. Both shear and tensile failure modes were identified. (Author)

AD-407 008 Div. 17
(TISTM/AMS) OTS price $1.10

General Dynamics Convair, San Diego, Calif.
EFFECT OF FATIGUE LOADING ON UNHEALED POROSITY VOID GROWTH,
by D. H. Love, G. D. Lindeneau, and W. E. Wise.
21 Sep 59, 5p. 8926 151
Contract AF33 657 8926
Unclassified report

Report on Material, Aluminum, 7075 T6.

Descriptors: *Aluminum alloys, *Fatigue (Mechanics), *Porosity, Magnesium alloys, Zinc alloys, Gases, Forging, Ultrasonic radiation, Tests.

Test specimens taken from 7075-T6 aluminum alloy forgings were chosen with voids (unhealed porosity) situated at the surface and center of test sections and fatigue tested at 20,000 psi gross stress in axial tension at a stress ratio of 0.05. Ultragraph recordings of void size were made throughout to note growth as fatigue stressing progressed. The test observations indicated that internal voids which did not emerge to specimen surfaces exerted little or no effect on fatigue life; however, those voids which appeared at specimen surfaces caused appreciable reductions in fatigue life. (Author)

AD-407 071 Div. 17
(TISTM/AMS) OTS price $10.10

Institute of Aerophysics, U. of Toronto (Canada).
AN INVESTIGATION OF THE FATIGUE OF ALUMINUM ALLOY DUE TO RANDOM LOADING,
by S. R. Swanson. Feb 63, 1v. 84
Contract AF49 638 548
Unclassified report

Descriptors: *Aluminum alloys, *Fatigue (Mechanics), Tests, Loading (Mechanics), Extrusion, Mathematical analysis, Test equipment, Statistical analysis, Experimental data.

A study of the aluminum alloy 2024-T4 under random and constant amplitude axial fatigue loading was undertaken using 1500 unnotched extruded bar specimens. In the constant amplitude test series, it was discovered that the stress amplitude - endurance (S-N) relation is well represented by two separate failure distributions such that, as the stress amplitude is lowered, the one distribution recedes while the other distribution becomes predominant. The knee of the S-N curve is then considered as a transition from endurances predominantly of the one distribution to endurances predominantly of the other. (Author)

AD-407 267 Div. 17
(TISTM/AMS) OTS price $.50

Watertown Arsenal Labs., Mass.
FLOW STRESS-STRAIN RELATIONSHIPS IN TENSION TESTS OF STEEL,
by John Nunes. Apr 63, 11p.
WAL TR834 2 10 Unclassified report

Descriptors: *Tensile properties, *Mathematical analysis, *Steel, Stresses, Plasticity, Theory, Mathematical models, Mechanical properties, Fracture (Mechanics), Ductility.

AD-407 341 Div. 17, 4
(TISTM/ODN) OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF MINUTE QUANTITIES OF SELECTED ELEMENTS IN BERYLLIUM.
Interim rept. no. 5, 6 Jan-6 Mar 63, by W. M. Henry. 29 May 63, 8p.
Contract NOw62 0629c
Unclassified report

Descriptors: *Beryllium, Impurities, Mass spectroscopy, Resistance (Electrical), Measurement, Oxygen, Sulfur, Hydrogen, Vacuum apparatus, Perchloric acid, Ammonium compounds, Hydroxides, Spectrum analyzers, Chemical analysis.

Solid spark mass-spectrographic and emission-spectrographic methods were developed for the determination of trace metallic impurities in beryllium. The analysis of trace amounts of nonmetallic impurities, especially oxygen, was less well established. Work is being continued on the development of analytical techniques for the analysis of minute traces of impurities in beryllium. Most emphasis is being given to the less well-established analysis of the nonmetallic impurities. (Author)

AD-407 363 Div. 17
(TISTM/AMS) OTS price $1.00

Watertown Arsenal Labs., Mass.
AUSTENITIC DECOMPOSITION IN WELDING STEEL,
by Mark M. D'Andrea, Jr. Mar 63, 33p.
Proj. 59332007
WAL TR320
Unclassified report

Master's thesis. Report on Materials for Army Weapons and Combat Mobility.

Descriptors: *Welding, *Steel, *Metallography, Microstructure, Hardness, Grain structures (Metallurgy), Heat treatment, Experimental data, Cooling, Toughness, Low temperature research, Impact shock, Bainite, Thermal expansion, Austenite, Welding.

A time-temperature controller was used in conjunction with a dilatometer to study the transformational behavior of weld heat-affected zone austenite upon cooling from a 1700 F peak temperature. Continuous-cooling transformation diagrams were made in this way of AISI 4340 steel initially quenched-and-tempered to 54 and 44 Rc hardness levels. A characteristic growth curve for an isothermal bainite transformation was determined dilatometrically. The amount of austenite retained at room temperature was found to increase and then decrease during the bainite rapid-reaction period. Impact tests indicated that retained austenite in the amounts present was not necessarily deleterious to notch toughness. A limited arc-welding study was made and compared with the time-temperature controller work. (Author)

AD-407 385 Div. 17, 26
(TISTM/AMS) OTS price $4.60

Experimental Inst. of Light Metals, Milan (Italy).
ANODIC METHOD FOR THE STUDY OF STRESS CORROSION OF ALUMINUM-MAGNESIUM ALLOYS.
29 Jan 63, 22p. Rept. no. 12 038/6301 102
Contract DA91 591EUC2067
Unclassified report

Descriptors: *Corrosion, *Aluminum alloys, *Test methods, Microstructure, Cooling, Tests, Aging (Materials), Hardness, Heat treatment, Cold working, Metallography, Experimental data, Stresses, Magnesium alloys.

AD-407 394 Div. 17
(TISTM/BRW) OTS price $1.00

Defense Metals Information Center, Columbus, Ohio.
STRUCTURAL CONSIDERATIONS IN DEVELOPING REFRACTORY METAL ALLOYS,
by R. I. Jaffee and G. T. Hahn. 31 Jan 63, 30p.
Rept no. 182
Contract AF33 616 7747, Proj. 2 8 8975
Unclassified report

Descriptors: *Heat resistant metals and alloys, *Metals, Group VI elements, Chromium, Molybdenum, Tungsten, Brittleness, Mechanical properties, Crystal lattice defects, Fracture (Mechanics), Stresses, Fractography, Alloys, Rhenium alloys, Ductility, Hardness, Microstructure, Impurities, Titanium alloys, Zirconium alloys, Hardening, Crystal structure.

Progress made in applying advanced techniques and structural concepts to the problem of strengthening the Group VI-A metals, Cr, Mo, and W, is examined. At low temperatures, $T/Tm<0.2$, dislocations and grain boundaries play an important role. High strength values and the marked temperature and strain-rate dependence of the yield stress exhibited by the Group VI-A metals in this range are consistent with the idea that dislocation movement is rate controlling and thermally activated. Dislocation-mobility considerations also point to the existence of high stresses in advance of a moving crack, and, consequently, a low level of crack-propagation resistance. A second factor contributing to the brittleness of Group VI-A metals is grain-boundary weakness caused by interstitial-atom impurities. Studies of rhenium additions to the Group VI-A metals suggest that the brittleness tendency can be inhibited by alloying. The origin of this effect has not been decided. (Author)

AD-407 426 Div. 17
(TISTM/BRW) OTS price $1.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
THE FLOW AND FRACTURE OF ZONE REFINED TUNGSTEN.
Quarterly progress rept. 1 Jan-31 Mar 63,
by John R. Wiese. 31 Mar 63, 10p. Q B1973 3
Contract DA36 034ORD3747RD, Proj. 59332008
WAL TR834 2 11 2
Unclassified report

Descriptors: *Tungsten, Resistance (Electrical), Measurement, Test methods, Single crystals, Cryogenics, Low temperature research, Electrical properties, Zone melting.

Zone-refining efforts were directed toward enhancing the control of the zone. These efforts included additional coil designs, effect of atmosphere gas velocities, and zone-refining while power fluctuations were at a minimum. Resistivity ratios were determined on two as-received electron-beam zone-refined single crystals of tungsten. A description of the measuring apparatus and the values obtained are presented. A technique for measuring resistivities by an eddy-current method is described briefly. (Author)

AD-407 432 Div. 17
(TISTM/AMS) OTS price $.75

Watertown Arsenal Labs., Mass.
TRANSITIONAL BEHAVIOR OF HIGH-STRENGTH STEEL PRESSURE VESSELS,
by John M. Ingraham. May 63, 30p.
Proj. 1H0 24401A111
WAL TR110 9 1 Unclassified report

Report on Materials for Solid Propellant Rocket Motors.

Descriptors: *Pressure vessels, *Steel, Density, Brittleness, Toughness, Tensile properties, Microstructure, Low-temperature research, Hardness, Chromium alloys, Molybdenum alloys, Transition temperature, Impact shock, Thickness, Tests, Fractography, Spheres, Hydrostatic pressure, Fracture (Mechanics).

Pressure vessels of nearly spherical geometry were hydrostatically tested to failure at various temperatures to determine the fracture transitional behavior of the materials. A comparison of the fracture surface markings was made with those of tensile test specimens fractured at similar test temperatures. Notch strength to tensile strength ratios were determined using both round and flat tensile specimens from the same alloys. It was concluded that the fracture transitional behavior, in pressure vessels fabricated from high-strength H11 steel and lower strength AISI 4340 steel, could be predicted with reasonable certainty from fracture surface evaluations of tensile specimens of the type used to determine the notch strength to tensile strength ratios. (Author)

AD-407 519 Div. 17
(TISTM/BRW) OTS price $2.25

Lockheed Aircraft Corp., Sunnyvale, Calif.
THERMODYNAMIC PROPERTIES OF MOLYBDENUM AND COLUMBIUM: AN ANNOTATED BIBLIOGRAPHY,
comp. by Jack B. Goldmann. Jun 63, 76p. Rept. no. SB62 69; 6 90 62 122
Unclassified report

Descriptors: *Bibliographies, *Heat resistant metals and alloys, Molybdenum, Niobium, Refractory materials, Thermodynamics, Heat of formation, Heat of activation, Entrophy, Thermal diffusion, Thermal conductivity, Emissivity, Phase studies, Hydrogen, Nitrogen, Oxidation, Alloys.

The data which are included encompass heat of formation, activity, entrophy, diffusion rates and diffusion constants. In addition, references to the research which has been done and the tests and instrumentation is noted. The period covered by this bibliography is 1924-1962, with special emphasis on the literature published since 1955. (Author)

AD-407 520 Div. 17
(TISTM/BRW) OTS price $8.60

Oregon Metallurgical Corp., Albany.
EVALUATION OF MOLYBDENUM METAL PRODUCED BY THE TIN REDUCTION OF MOLYBDENUM DISULPHIDE.
Final rept., Apr 58-Mar 63.
13 Apr 63, 94p.
Contracts NOrd 18124 and NOw62 0754
Unclassified report

Descriptors: *Molybdenum, Molybdenum compounds, Sulfides, Reduction (Chemistry), Tin, Controlled atmospheres, Hydrogen, Carbon, Oxygen, Impurities, Tensile properties, Castings, Fractography, Production.

A low carbon, low oxygen, low metallic impurity molybdenum disulfide reduced with tin in a pure hydrogen or inert gas atmosphere will yield molybdenum metal powder with lower interstitials than commercially available molybdenum produced by the hydrogen reduction of molybdenum oxide. A hydrogen system atmosphere or partial hydrogen inert gas atmosphere was found preferable to inert gas because higher quality metal could be produced from molybdenite containing carbon and oxygen species impurities. Exhausting hydrogen gas to atmosphere would be preferable to recycling in this process to preclude recycling gaseous impurities which may not be removed continuously in a gas purification system. (Author)

AD-407 523 Div. 17, 26
(TISTM/AM) OTS price $4.60

Westinghouse Electric Corp., Blairsville, Pa.
MOLYBDENUM FORGING PROCESS DEVELOPMENT.
Interim technical progress rept. no. 9,
15 Sep 62-14 June 63,
by A. W. Goldenstein. 14 June 63, 31p.
Contract AF33 600 41419, Proj. 7 756
ASD TR7 756, vol. 9 Unclassified report

Descriptors: *Molybdenum alloys, Heat treatment, Temperature, Extrusion, Recrystallization, Hot working, Material forming, Titanium alloys, Zirconium alloys, Carbon alloys, Forging.

A reproducible process for forging thin-section shapes of TZM alloy was demonstrated. Forgings produced met all contract requirements including surface finish (125 RMS) and web thickness (0.130 in. max.). An approved modification of the original flame-shield design incorporating one heavy central rib instead of two thin ribs and appropriate changes in forging dies was made. The effects of forging and annealing temperatures, methods of forming blanks, trimming, the number of forging blows per heat, in-process and final conditioning, positioning of the forging blank, and cleanliness were investigated in relationship to forgeability and final quality. Some of the above would be required to produce any new forging, some were performed in earlier phases but with less emphasis on forgeability, some might be classified as shop practice or die design but all of it was essential to successful production of the desired forging. Some essential features of the developed process are: (1) rapid transfer from furnace to die; (2) restricting time in forging dies by limiting forging to only a few rapid, hard blows per heat (one blow per heat for this forging); (3) repeated reheats; (4) in-process anneals; and (5) careful in-process conditioning. (Author)

AD-407 588 Div. 17
(TISTM/TCG) OTS price $1.60

General Dynamics, Convair, San Diego, Calif.
SEAM WELDS WITH Ti-6Al-4V TITANIUM SHEET,
by H. H. Stier. 27 Dec 56, 13p. 56 115; 8926 160
Contract AF33 657 8926
Unclassified report

Report on Material - Titanium - Ti 6Al-4V, Commercially Pure (A-70) Seam Weld Strengths.

Descriptors: *Titanium, *Titanium alloys, *Vanadium alloys, *Welds, Mechanical properties, Welding, Resistance welding, Spot welding, Failure (Mechanics), Metal plates, Tensile properties.

Seam welds were made by the electric resistance, roller welding practice in a variety of welding combinations comprised of 0.012 in. thick rigidized commercially pure, 0.025 in. thick commercially pure, and 0.025 in., 0.032 in. and 0.040 in. thick Ti 6Al-4V alloys. Tension testing revealed that in all cases, except that one in which 0.040 in. thick Ti 6Al-4V comprised the thinnest weld joint member, failures occurred in the parent metal; in the exception noted the failure took place in the heat affected zone adjacent to the weld. The efficiency of the weld joints was thus found to be 100%, except in the case of 0.040 in. thick Ti 6Al-4V where it was found to be 92%. (Author)

AD-407 594 Div. 17
(TISTM/TCG) OTS price $1.10

General Dynamics, Convair, San Diego, Calif.
MATERIAL - ALUMINUM - 7178-T6. EFFECT OF INTERRUPTED AGING TREATMENTS ON MECHANICAL PROPERTIES,
by P. W. Bergstedt, H. C. Turner, and W. M. Sutherland. 29 Jan 57, 6p. 8926 163; 56 239
Contract AF33 600 8926
Unclassified report

Descriptors: *Aluminum alloys, Heat treatment, Mechanical properties, Tensile properties, Ductility, Aging (Materials).

Bare 0.064-in. thick 7178-0 sheet, clad 0.064-in. thick 7178-T6 sheet, and 0.125-in. thick 1-1/4-in. by 1-1/4-in. extruded 7178-0 angle was solution heat treated at 870 F for 30, or 40 min.,

quenched in cold water and aged with a variety of interrupted aging treatments which consisted of two steps; an initial nucleation treatment and a final growth treatment. The nucleation treatments used were 212 F for 4 hrs. and 230 F for 3 hrs. The growth treatments used with the nucleation treatments included 325 F for 1 to 5 hrs. Most of the aging treatments produced excellent yield strengths, but ultimate strength and elongation losses were experienced in varying degree, although in all cases military specification minima were exceeded. The aging treatment consisting of 250 F for 3 hrs. plus 300 F for 4 hrs. produced the best and most consistent mechanical properties among those observed. (Author)

AD-407 602 Div. 17
(TISTM/TCG) OTS price $2.60

General Dynamics/Convair, San Diego, Calif.
MATERIAL - FINISHES AND COATINGS - ZINC, SILVER, CHROMIUM, NICKEL PLATES. EFFECT OF ELECTROPLATED AND CHEMICALLY PLATED COATINGS ON STRENGTH, CORROSION, HEAT RESISTANT AND ABRASION RESISTANT PROPERTIES OF 4340 STEEL AT 280,000 TO 300,000 PSI ULTIMATE STRENGTH,
by D. M. Forney, Jr., R. J. Haney, and W. E. Wise.
27 Aug 57, 25p. Rept. no. 8926 169; 56 623
Contracts AF33 657 8926 and AF33 600 30169
Unclassified report

Descriptors: *Heat-resistant metals & alloys, *Steel, *Plating, Coatings, Chromizing, Nickel, Silver, Zinc, Tensile properties, Salt spray tests, Corrosion, Heat, Fatigue (Mechanics), Protective treatments, Electroplating, Metal coatings.

Effect of electroplated and chemically plated coatings on strength, corrosion, heat resistant and abrasion resistant properties of 4340 steel at 280,000 to 300,000 psi ultimate strength. Test findings were as follows: (1) significant ultimate and yield tensile strength losses did not result from plating; (2) reduction of area losses ranging 7% for chemical Ni to 98% for electrolyzed Cr occurred; (3) 55 and 84% of elongation was lost for all but electrolytic and chemical Ni plate. Baking restored the losses found with Ag plate and restored the losses experienced with Zn plating; zinc plated coatings resulted in the higher fatigue life. Post plating baking at 375 F was detrimental in every case; chemical Ni, Ag, electrolytic Ni, electrolyzed Cr and Zn resisted 200, 96, 96, 48 and 48 hr, respectively, of salt spray corrosion and chemical Ni coating showed the greater wear resistance. (Author)

AD-407 613 Div. 17, 25
(TISTM/EJH) OTS price $1.60

California U., Berkeley.
THERMAL PROPERTIES OF ALLOYS AT HIGH TEMPERATURES. Final rept.,
by Raymond L. Orr and Ralph Hultgren. 1 Mar 63, 10p. Series no. 137, Issue no. 8
Contract AF49 638 83
AFOSR 4614 Unclassified report

Descriptors: *Specific heat, *Metals, *Alloys, *Heat-resistant metals & alloys, Thermodynamics, High-temperature research, Calorimeters, Chromium, Iron, Hafnium, Platinum, Thallium, Iron alloys, Aluminum alloys, Gold alloys, Silver alloys, Chromium alloys, Nickel alloys, Bismuth alloys, Copper alloys, Zinc alloys, Lead alloys.

The objectives of this investigation were to determine the high temperature thermal properties of various representative alloy systems from heat content measurements, to examine the validity of Kopp's Law of additivity of heat capacities of the components, and where possible to correlate the data with various aspects of atomic bonding phenomena in alloys. Heat contents also were measured for a number of pure metals for which existing data were either incomplete or uncertain. This report reviews briefly the accomplishments of this project, referring where possible to the published papers and technical notes previously submitted. Copies of Technical Note No. 7 and of the most recent publication resulting from this project are submitted as part of this report. (Author)

AD-407 619 Div. 17, 31
(TISTM/EJH) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
MATERIAL - MAGNESIUM - ALUMINUM - ZINC - SACRIFICIAL ANODE. EVALUATIONS IN PRESENCE OF SEA WATER AND CLAD 7075-T6 ALUMINUM ALLOY,
by A. F. Hooper, R. H. Whidden, and W. M. Sutherland. 2 May 57, 12p. Rept. no. 8926 157; 56 34
Contract AF33 657 8926
Unclassified report

Descriptors: *Cathodic protection, *Aluminum alloys, Anodes (Electrolytic cells), Zinc, Magnesium alloys, Sea water, Corrosion inhibition, Test methods.

Bi-metallic cells consisting of FS-1H magnesium alloy, commercially pure zinc or XA605 aluminum alloy and clad 7075-T6 aluminum alloy were prepared with anode-cathode area ratios of 1:1 and 1:2 and immersed in sea water for measurements of current density versus time and observations of corrosion damage. The FS-1H magnesium alloy anodes corroded severely themselves and did not prevent pitting of clad 7075-T6 aluminum alloy. The commercially pure zinc and XA605 aluminum alloy anodes corroded slightly and prevented corrosion of the clad 7075-T6 aluminum alloy. Current densities over a 24-hr period are reported. (Author)

AD-407 621 Div. 17
(TISTM/TCG) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
MATERIAL - TITANIUM - COMMERCIALLY PURE, Ti 6Al-4V, Ti 5Al-2-1/2 Sn. STATIC AND FATIGUE STRENGTH OF DISSIMILAR ALLOY SPOTWELDS,
by E. K. Winslow, G. D. Lindeneau, and W. E. Wise.
18 Apr 57, 17p. Rept. no. 8926 170; 56 827
Contracts AF33 657 8926 and AF33 600 31174
Unclassified report

Descriptors: *Titanium, *Titanium alloys, *Spot welds, Alloys, Shear stresses, Tensile properties, Elasticity, Ductility, Failure (Mechanics), Hydrogen, Chemical analysis, Vanadium alloys, Tin alloys, Aluminum alloys, Fatigue (Mechanics).

Three spotwelded, lap seam combinations comprised of (1) 0.025 in. thick Ti 6Al-4V and 0.025 in. thick commercially pure Ti; (2) 0.025 in. thick Ti 5Al-2.5 Sn and 0.025 in. thick commercially pure Ti; and, (3) 0.025 in. thick Ti 6Al-4V and 0.025 in. thick Ti 5Al-2.5 Sn were tension-shear,

cross-tension and fatigue tested. The average tension - shear strengths of combinations (1), (2) and (3) were 908, 955 and 959 lb/spot, respectively, and the average cross-tension strengths were 302, 236 and 275 lb/spot, respectively. The respective tension-shear cross-tension ratios were 0.33, 0.25, and 0.29. The fatigue strengths for 10 to the 7th power cycles life were 53, 86 and 97 lb/spot, respectively. (Author)

AD-407 690 Div. 17
(TISTM/BRW) OTS price $2.50

Crucible Steel Co. of America, Pittsburgh, Pa.
RESEARCH ON WORKABLE REFRACTORY ALLOYS OF TUNGSTEN, TANTALUM, MOLYBDENUM, AND COLUMBIUM.
Final rept., 15 Apr 61-15 Nov 62,
by R. C. Westgren, V. R. Thompson, and V. C. Petersen. Apr 63, 98p.
Contract AF33 616 8135, Proj. 7351, Task 735101
WADD TR61 134 P2 Unclassified report

Report on Metallic Materials.

Descriptors: *Heat resistant metals and alloys, Molybdenum alloys, Niobium alloys, Tantalum alloys, Tungsten alloys, Tungsten, Vanadium alloys, Zirconium alloys, Carbon alloys, Sheets, Melting, Extrusion, Rolling mills, Metallography, Mechanical properties, Recrystallization, Tensile properties, Microstructure, Heat treatment, Dispersion hardening, High temperature research.

The W-Ta-Mo-Cb alloy system was previously investigated, and several tungsten- and tantalum-rich alloys were developed and evaluated in the form of extruded bars. Many of these alloys exhibited very high strengths at 3000 F. Effort was aimed at producing and evaluating alloys from the W-Ta-Mo-Cb system in the form of sheet (Phase I) and increasing its high-temperature strength by the formation of dispersed carbides (Phase II). For Phase I, small cylindrical ingots of six selected alloys and unalloyed tungsten were consumable vacuum arc-melted by a multiple electrode technique and successfully extruded to sheet bars. Two alloys and unalloyed tungsten were rolled to sheet and recrystallization temperatures, bend transition temperatures, and high-temperature tensile properties were determined. The other four alloys could not be rolled to sheet by the techniques attempted. Experiments under phase II resulted in the development of a successful technique for consumably vacuum arc melting 88W-12Cb alloys that contained small amounts of vanacium, zirconium, and carbon. These alloys showed 2500 F tensile strengths at 49,000 to 57,000 psi--this constituted a twofold increase in strength above that of the base solid solution composition.

18. MILITARY SCIENCES AND OPERATIONS

AD-406 949 Div. 18
(TISTM/AAR) OTS price $1.60

System Development Corp., Santa Monica, Calif.
COMMAND AND CONTROL FOR SELECTIVE RESPONSE.
Scientific rept.,
by Herbert D. Benington. 13 May 63, 16p. SP635
Unclassified report

Descriptors: *Strategic warfare, *Nuclear warfare, Selection, Feasibility studies, Control.

During the past several years, there has been a growing awareness that an effective strategic capability requires more than survivable forces, some warning and defensive capability, and a plan and resolve to employ these resources. It also depends upon a command capability whereby national political or military leaders can operate or control the resources according to the plan. This recognition has caused new emphasis to be placed on the problem of command and control. This chapter considers command and control in the conduct of two different strategies of central nuclear war: first, a spasm war that unleashes an unlimited nuclear strike as quickly and thoroughly as possible; second, a strategy of selected response that allows deliberate commitment of small, moderate, or very large portions of the strategic offensive capacity of the United States in accordance with both military and political considerations. The command and control required for conduct of limited strategic war is then considered in relation to these two alternatives. (Author)

AD-407 626 Div. 18, 30
(TISTB/DGH) OTS price $7.60

Dunlap and Associates, Inc., Stamford, Conn.
COMPARISON OF ALTERNATIVE COMMUNICATIONS AND DATA PROCESSING DESIGNS FOR THE CONUS LOGISTICS SYSTEM.
10 Oct 62, 1v. Working paper no. 7
Contract Nonr364200
Unclassified report

Descriptors: *Logistics, *Material control, *Department of Defense, Data processing systems, Supply depots, Telephone communication systems, Multichannel telephone systems, Documentation, Automation, Personnel, Costs, Navy, Communication systems.

Two alternative designs for the communications and data processing portion of the Navy supply system in CONUS are described and compared in terms of estimated costs and performance characteristics. The two designs were selected for investigation on the basis that they appeared to be promising and that they were substantially different from each other. However, both designs reflect current Defense Department trends toward standardization and centralization. (Author)

19. NAVIGATION

AD-407 062 Div. 19, 1
(TISTA/GEC) OTS price $5.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
STANDARD DIRECTIONAL LOCALIZER OVERFLIGHT INTERFERENCE.
Final rept.,
by F. W. Marschall. July 62, 8p.
Proj. 114 10 2X
Unclassified report

Descriptors: *Glide path systems, Waveguides, Antenna radiation patterns, Flight paths, Aircraft, Flight testing, Mathematical analysis, Radio beams, Instrument landings, Radio interference, Interference.

This report describes the reflection interference effects of overflying aircraft on ILS localizer receivers in the landing area. The data were derived from field tests and mathematical analysis, and include both static and dynamic receivers. Field test data were gathered using a standard directional waveguide localizer. A typical volume in which one aircraft would cause interference to a second aircraft that is in a landing configuration near touchdown is presented. Here the interfered aircraft is landing at 210 fps, 10,000 ft from the localizer, and the interfering aircraft is a DC-3 traveling in the same direction at 340 fps. Interference volumes will have different geometries and positions depending upon geometry and velocities of the aircraft, cross section of the interfering aircraft, beam structures of the antennas, and criteria used for interference. Interference volumes are limited in azimuth to plus and minus 8 degrees. Interference volumes are limited in altitude by the RF cross sectional area of the interfering aircraft and the vertical lobe structure of the localizer antenna. Volumes of interference parallel to the runway that are generated by aircraft flying parallel to the runway are primarily limited by the frequency of the interference. (Author)

AD-407 250 Div. 19, 12
(TISTB/HSS) OTS price $5.60

Raytheon Co., Bedford, Mass.
INVESTIGATION OF ACTIVE DOPPLER VELOCITY SENSOR.
Quarterly engineering rept. no. 4, 1 Mar-31 May 63.
June 63, 1v. Rept. no. BR2457
Contract AF33 657 9241
Unclassified report

Descriptors: *Radar navigation, Guidance, Navigation, Doppler radar, High altitude, Aerospace planes, Ground speed, Ground speed indicators, Flight instruments, Flight testing, Doppler navigation, Doppler systems, Velocity, Navigation computer, Timing circuits, Control systems, Ultra high frequency, Aerospace craft.

A study program is directed toward the advancement of the state-of-the-art of doppler navigation radar techniques to meet the high speed, high altitude requirements of an aerospace vehicle. Flight testing of the manual spectral compression system is reported, with band-width compression ratios of the order of 10 to 1 being achieved. The preliminary development of the Computer and Control unit was completed, and fabrication of the flyable model was essentially completed. The Computer and Control unit was designed to evaluate the two types of velocity determination: modulation slope dependent; and modulation slope independent. (Author)

AD-407 564 Div. 19, 1
(TISTA/GEC) OTS price $2.25

Eclipse Pioneer Div., Bendix Corp., Teterboro, N. J.
STUDY PROGRAM FOR ALL-WEATHER INSTRUMENT LANDING SYSTEM.
Final rept.,
by J. McInerney. 15 Oct 62, 89p.
Contract FAA/ARDS572, Proj. 114 15
Unclassified report

Report on Phase 1.

Descriptors: *Aircraft, *Instrument panels, *Display systems, *Instrument landings, Flight instruments, Glide path systems, Flight speed indicators, Attitude indicators, Altimeters, Course indicators, Design, Costs, Airplane landings, All-weather aviation.

This report specifies recommended system concepts for integration of an Instrument Panel best suited for monitoring an Automatic All-Weather Landing or conducting a manual landing in low-visibility, low-ceiling conditions. The instrument panel displays recommended fulfill the requirements of presenting all the presently available navigation and landing air parameters required for this program. The detailed panel layouts, block diagrams depicting the system interconnections, price, delivery, and other pertinent information have been included to aid in the choice of the most economical and technically feasible system. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-406 941 Div. 20
(TISTP/RLG) OTS price $2.60

Washington U., Seattle.
NUCLEAR MAGNETIC RELAXATION TIMES.
Final rept.,
by Edwin A. Uehling. 2 Apr 63, 21p.
Contract AF49 638 92
AFOSR 4708
Unclassified report

Continuation of Contract AF18 600 653.

Descriptors: *Nuclear magnetic moments, *Nuclear electric moments, *Nuclear physics, Chemical bonds, Measurement, Phase studies, Nuclear spins, Motion, Crystals, Arsenic, Temperature, Experimental data, Frequency, Protons, Potassium compounds, Phosphates, Heat of activation, Ferroelectricity, Excitation, Acoustics, Electrical conductance, Ions, Polarization, Attenuation, Magnetic fields, Nuclei, Deuterated compounds, Diffusion, Relaxation time, Nuclear reactions, Solids.

The research done deals principally with those nuclear relaxation processes in solids which depend on the presence of an electric quadrupole interaction. The results fall into two broad categories, one of which is concerned with the understanding of the various relaxation processes which are encountered, and the other involves the measurement of important physical parameters. While the greatest emphasis was initially placed on the understanding of relaxation processes, probably the most important single result of this research falls into the second of these two categories. This is the measurement of an activation energy which is of importance in connection with deuteron relaxation in hydrogen bonded crystals and which turns out to be of importance also in certain theories of the ferroelectric phase transition. The significance of this connection is described in detail. (Author)

Division 20 - NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-407 036 Div. 20
(TISTP/MFA) OTS price $6.60

Naval Research Lab., Washington, D. C.
AN INVESTIGATION OF THE PHENOMENOLOGICAL CHARACTERISTICS OF (PROTON, GAMMA) RESONANCES,
by R. O. Bondelid and J. W. Butler. 7 May 63, 59p.
NRL Rept. 5897 Unclassified report

Descriptors: *Gamma rays, *Hydrogen, Molecular beams, Electron bombardment, Electrostatics, Nuclear scattering, Proton beams, Calibration, Targets, Aluminum, Silicon, Carbon, Nickel, Nitrogen, Copper, Nuclear resonance, Proton bombardment.

The observation of some 'anomalies' in the behavior of gamma-ray resonances induced by hydrogen molecular ion beams has led to an exhaustive investigation of these and other new anomalies, including some involving proton beams. Most of the observations have been made with respect to the 992-KEV resonance in the Al27 (proton, gamma) Si28 reaction, but the following have also been used: the 1317-KEV resonance in the same reaction, the 1747-KEV resonance in the C13 (proton, gamma) N14 reaction, the 1424-KEV resonance of the Ni58 (proton, gamma) Cu59 reaction, and the 1843-KEV resonance in the same reaction. (Author)

AD-407 066 Div. 20
(TISTP/RLG) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
ESTIMATES OF FISSION PRODUCT YIELDS OF A THERMONUCLEAR EXPLOSION,
by G. R. Crocker. 4 Apr 63, 24p.
NRDL TR642 Unclassified report

Descriptors: *Fission products, *Nuclear explosions, *Radioactive fallout, Mathematical models, Radioactive isotopes, Fission, Data, Mass-energy relation, Uranium, Thermonuclear reactions, Determination.

Chain yields and independent yields of the U238 fission products from a thermonuclear explosion were estimated. Since unclassified data for this kind of process are scanty, some features of the mass yield curve were inferred from published data on U238 fission by neutrons ranging from fission-spectrum energies to 14 Mev. Independent yields of the fission products were then calculated by application of the equal charge displacement theory of nuclear charge distribution in fission processes. (Author)

AD-407 073 Div. 20, 25
(TISTP/MFA) OTS price $1.60

Naval Research Lab., Washington, D. C.
IN-PILE HALL COEFFICIENT AND CONDUCTIVITY MEASUREMENTS ON ZONE-REFINED P-TYPE SILICON,
by G. C. Bailey and C. M. Williams. 13 May 63, 12p.
NRL Rept. no. 5930 Unclassified report

Descriptors: *Hall effect, *Radiation damage, Single crystals, Resistance (Electrical), Electrical properties, Magnetic fields, Probes (Electromagnetic), Zone melting, Electron density, Neutron flux, Neutron beams, Potentiometers, Measurement, Silicon.

The Hall coefficient and conductivity have been measured during pile irradiation for a number of zone-refined p-type silicon crystals with initial resistivities of 1, 8, and 100 ohm-cm. The conductivity of zone-refined silicon shows much faster changes with irradiation than pulled silicon samples of equivalent resistivity. The 100-ohm-cm samples exhibit a monotonic nonlinear decrease of ln sigma (conductivity) vs phi f (integrated fast flux), whereas the other samples with initial Fermi levels closer to the valence band have one or two regions of linear decrease in ln sigma vs phi f before the nonlinear decrease region is observed. The Hall mobility for the 100-ohm-cm samples decreases and becomes negative as a result of the carrier density decreasing with irradiation. In the case of the 8-ohm-cm sample, the Hall mobility decreases with irradiation, whereas the 1-ohm-cm sample shows no change in Hall mobility with irradiation up to the maximum integrated flux used in the present experiment. The origins of the dependence of ln sigma on phi f as well as the behavior of the Hall coefficient and Hall mobility with irradiation are discussed. (Author)

AD-407 142 Div. 20, 12, 6
(TISTP/JEA) OTS price $1.60

Naval Research Lab., Washington, D. C.
THERMOLUMINESCENT DOSIMETERS ON RECOVERABLE SATELLITES,
by F. H. Attix, E. J. West, and W. E. Price.
28 May 63, 10p.
Navy Proj. RR008 03 46 5667
NRL 5938 Unclassified report

Descriptors: *Dosimeters, *Radiation measurement systems, Satellites (Artificial), Recovery, Gamma rays, Luminescence, Instrumentation, Low orbital trajectories, Calcium compounds, Fluorides, Crystals, Manganese, Thermoluminescence, Spaceborne.

Dosimeters for ionizing radiation, based upon thermoluminescence in CaF2:Mn, have been described by Schulman, et al., Rev. Sci. Instr. 31:1263 (1960). A miniature version, 1 mm dia and 13 mm long, was recently developed at NRL. Groups of these dosimeters were flown on six recoverable satellites, from which four payload capsules were successfully retrieved and the dosimeters returned for readout. The polar orbits had apogees ranging from 306 to 578 km, and the satellites made 18 to 65 revolutions before recovery. The resulting absorbed doses for dosimeters shielded by 1.7 g/sq cm of low-atomic-number material ranged from 1.8 to 4.5 millirad per orbit, based upon Co60 gamma-ray calibrations. Dosimeters enclosed in an added 14 g/sq cm Pb read about 43% less, in rough agreement with calculation based upon a trapped-proton spectrum. The observed readings are not inconsistent with the assumption that most of the proton flux was encountered in a region over the South Atlantic. (Author)

AD-407 166 Div. 20
(TISTP/RLG) OTS price $2.60

Stockholm U. (Sweden).
HIGH ENERGY PHYSICS PROPERTIES OF ANTIPROTONS,

K MESONS, HYPERONS, AND PIONS.
Technical rept.,
by A. G. Ekspong. 31 Oct 62, 24p.
Grant AF EOAR 62 15
AFOSR 4737 Unclassified report

Descriptors: *Nuclear particles, *Nuclear energy levels, Charged particles, Antiprotons, Mesons, Hyperons, Pions, Momentum, Annihilation reactions, Nuclear scattering, Nuclear cross sections, Differential cross sections, Distribution, Scanning, Bubble chambers, Atomic properties, Nuclear reaction.

AD-407 281 Div. 20, 4
(TISTM/ODN) OTS price $2.60

Chicago U., Ill.
HYDROGEN TRACER STUDIES ON THE REACTIONS OF URANIUM HYDRIDE WITH AQUEOUS OXIDIZING AGENTS.
Final rept., part 1,
by John B. Hunt and Henry Taube. 14 Dec 62, 24p.
Contract Nonr212116, Proj. NR052 415
Unclassified report

Descriptors: *Uranium compounds, *Tracer studies, Deuterated compounds, Deuterium, Chemical reactions, Hydrochloric acid, Water, Isotopes, Chemical analysis, Ions, Cerium compounds, Solutions, X-ray diffraction analysis, Sulfuric acid, Phosphoric acids, Iron compounds, Chlorides, Tellurium compounds, Cyanides, Silver compounds, Nitrates, Hydrogen peroxide, Ammonium compounds, Titanium compounds, Zirconium compounds, Solvent action, Reaction kinetics, Oxidizers, Hydrides, Hydrogen.

The reaction of UD3 with concentrated HC1 in H20 forms HD as the principal gaseous product. When the concentration of the acid is reduced to ca. 9.5 M, reaction is much slower, and H2 and D2 are the chief gaseous products. Little D is lost to the solvent by exchange, although this does become a feature of the results at still lower acidity. The rates of the reaction are very sensitive to the anion which is present. When Ce(IV) for example is the oxidizing agent, the D2 originally contained in the solid is liberated essentially quantitatively and no other gaseous product is formed. These and related results are interpreted on the assumption that a barrier layer, presumably U02, governs the rate and mechanism of the reaction. (Author)

AD-407 300 Div. 20
(TISTP/RLG) OTS price $3.60

Mitre Corp., Bedford, Mass.
TECHNIQUES FOR NUCLEAR SHIELDING CALCULATIONS,
by K. F. Hansen. May 63, 29p. TM3522
Contract AF19 628 2390, Proj. 477L
ESD TDR63 231 Unclassified report

Descriptors: *Shielding, *Mathematical prediction, *Numerical ana'ysis, Special functions, Monte Carlo method, Factor analysis, Integral equations, Neutrons, Photons, Nuclear cross sections, Nuclear particles, Numerical methods and procedures, Integration.

Reviews and critiques of selected methods for nuclear shielding calculations are presented. Those techniques considered are numerical integration of the Boltzmann equation, moments method, Monte Carlo, method of successive scatterings, and removal cross-section method. An outline of the advantages and disadvantages of each particular method is included, along with a new simplified calculation procedure. (Author)

AD-407 307 Div. 20, 25
(TISTP/RLG) OTS price $9.60

Naval Ordnance Test Station, China Lake, Calif.
BLACK-BODY RADIATION FUNCTIONS,
by G. T. Stevenson. May 63, 118p.
NAVWEPS 7621; NOTS TP 2623
Unclassified report

Descriptors: *Blackbody radiation, Tables, Binomials, Integrals, Functions.

The table of black-body radiation functions from the 'American Institute of Physics Handbook' is extended to include more places and additional intermediate values. (Author)

AD-407 337 Div. 20
(TISTP/MFA) OTS price $1.10

John Hopkins U., Baltimore, Md.
DECAY ASYMMETRIES OF CHARGED SIGMA HYPERONS,
by M. M. Nussbaum, R. W. Kraemer, A. Pevsner, M. Block, and A. Kovacs. 28 Mar 63, 6p.
AEC NP12650
Unclassified report

Descriptors: *Hyperons, Parity, Decay schemes, Pions, Nucleous, Polarization, Bubble chambers, Nuclear reactions, Protons, Charged particles.

AD-407 579 Div. 20, 8
(TISTB/AAR) OTS price $1.60

Washington State U., Pullman.
PROSPECTIVE ANTIRADIATION AGENTS.
Annual progress rept., 1 Apr 62-31 Mar 63,
by Gardner W. Stacy. 31 Mar 63, 11p.
Contract DA49 193md2049
Unclassified report

Descriptors: *Radioprotective agents, *Organic compounds, Pharmacology, Synthesis.

The extension of the five-step synthesis of 3-amino-2-methyl-2-butanethiol hydrochloride was described. An investigation of possible reaction of acetylene with 1-carbethoxy-3-pyrrolidone was pursued with the hope of forming an intermediate acetylenic carbinol which would ultimately lead to an aminothiol wherein the amino group would be part of the heterocyclic five-membered ring. The possibilities of forming aminothiols from aminoalkenes formed from Schiff bases was also investigated, but unfortunately, these intermediates failed to react with thiols to produce the described sulfide. The synthesis of aminoalkanethiols was also described. (Author)

21. NUCLEAR PROPULSION

No Entries

Division 22 - ORDNANCE
Division 23 - PERSONNEL AND TRAINING

22. ORDNANCE

AD-407 064 Div. 22
(TISTA/GEC) OTS price $1.60

Frankford Arsenal, Philadelphia, Pa.
IMPROVEMENT OF INITIATOR FIRING MECHANISMS,
by J. M. DiPhillipo. Jan 63, 13p.
FA TM M63 22 1 Unclassified report

Descriptors: *Explosives initiators, Design, Tests, Redundant components, Feasibility studies, Firing mechanisms.

The accomplishments made in the design and development of an initiator that could be fired by either a mechanical, an electrical, or a gas pressure source are described. Twenty-eight test firings were conducted at 70 F to prove the feasibility of this design and obtain performance characteristics. Initiators can be provided with multi-means of firing and would provide an advantage to user personnel. (Author)

AD-407 079 Div. 22
(TISTM/ODN) OTS price $4.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
COMPOSITION B4, A NON-EXUDING EXPLOSIVE FILLER FOR ARTILLERY SHELL,
by Morris E. Pollack, Robert T. Schimmel, and Stanley J. Lowell. Apr 63, 49p.
AED TM1149 Unclassified report

Descriptors: *Explosive materials, *RDX, *TNT, Calcium compounds, High explosive ammunition, Projectiles, Silicates, Sensitivity, Tests, Military requirements, Specifications, Safety, Firing tests (Ordnance), Loading.

Composition B4 (60/39.5/0.5 RDX/TNT/calcium silicate), a non-exuding explosive, was satisfactorily loaded into Shell, HE, 175mm T203E9. Laboratory test results indicated that this non-exuding explosive is less sensitive to impact than Composition B. Safety tests have been conducted on 200 Composition B4-loaded T203E9 175mm Shell. These were fired at chamber pressures from 105-120% of gun rated pressure and satisfactorily withstood setback pressures of 27,000 psi. Although shells loaded with Composition B4 develop more cracks than those with Composition B they can be fired satisfactorily in all of the currently standard artillery weapons. The sensitivity of RDX/TNT compositions is not adversely affected by ommission of the wax, so-called, desensitizing agent. (Author)

AD-407 253 Div. 22
(TISTP/FEM) OTS price $1.10

General Technology Corp., Elgin, Ill.
RESEARCH AND DEVELOPMENT STUDY OF STRESS-STRAIN CHARACTERISTICS OF SHELLS AND HIGH EXPLOSIVES.
Quarterly progress rept. no. 13, 1 Mar-31 May 63. 31 May 63, 3p.
Contract DA11 022 5010RD2917
Unclassified report

Descriptors: *Projectiles, *High explosive ammunition, *Cylindrical bodies, *Bodies of revolution, Stresses, Deflection, Conical bodies, Explosive materials, Detonations, Rotating bands, Surface properties, Analysis.

AD-407 355 Div. 22
(TISTP/AW) OTS price $1.60

Harry Diamond Labs., Washington, D. C.
NOTES ON DEVELOPMENT TYPE MATERIEL FUZE, PIBD, T278E8,
by Louis Richmond. 15 Apr 63, 26p.
Proj. 43500
HDL DM63 1 Unclassified report

Descriptors: *Projectile fuzes, *Fuzes (Ordnance), High-explosive ammunition, Anti-tank ammunition, Impact fuzes, Operation, Design, Arming devices, Electric fuzes, Point-initiating fuzes, Base-detonating fuzes.

Fuze, Point Initiated, Base Detonating, T278E8 (M530A1) is described. The fuze is a modified M530 (T278E7), and is intended for use in the M371 90-mm recoilless HEAT cartridge. The T278E8 was developed to provide a minimum arming range of 30 feet for the M371 cartridge, as required by the military characteristics. The arming range provided by the M530 fuze is about 16 feet. The T278E8 fuze has been standardized as Fuze, PIBD, M530A1, Standard A for the M371 Cartridge. (Author)

AD-407 608 Div. 22
(TISTP/RLG) OTS price $6.60

Frankford Arsenal, Philadelphia, Pa.
DESIGN AND DEVELOPMENT OF CARTRIDGE, 20MM, APIT T230E1,
by Martin Tyska. Feb 63, 62p.
DA Proj. 504 05 029
FA Rept. R 1593 Unclassified report

Descriptors: *Cartridges, *Small arms ammunition, *Terminal ballistics, *Penetration, Incendiary ammunition, Armor piercing ammunition, Tracers (Ordnance), Costs, Quality control, Sensitivity, Design, Firing tests (Ordnance), Photographic analysis, Tests.

Development of a 20mm APIT cartridge capable of delivering improved terminal incendiary effects against aircraft and light-armored targets was undertaken by Frankford Arsenal. Armor piercing characteristics comparable to existing API shot were to be maintained. Approximately 2500 cartridges were fabricated for use in this development. Vastly improved terminal incendiary effects were exhibited against aircraft and light armored vehicle type targets. Armor penetration, accuracy and ballistic match (with M56A2 HEI round) firing results were good. However, premature termination of this development resulted in a redesigned APIT cartridge which, in its present state, does not meet all of the design objectives and consequently is not suitable for service adoption. (Author)

23. PERSONNEL AND TRAINING

AD-407 460 Div. 23
(TISTB/DGH) OTS price $2.60

Educational Research Corp., Cambridge, Mass.
THE DEVELOPMENT OF A PROFICIENCY TEST FOR SAGE

IDENTIFICATION BRANCH PERSONNEL.
Final rept.,
by Robert J. Curran. June 61, 16p.
Contract AF19 604 5195, Proj. 1975, Task 76892
ESD TR61 25 3 Unclassified report

Descriptors: *Performance test, *Test construction (Phychology), *Job analysis, *Identification systems, Photographs, Simulations, Air control centers, Air defense command, Antiaircraft defense systems, Early warning systems, National defense, Display systems, Training devices, Operators (Personnel), Personnel.

An earlier part of this project was to develop a prototype, job-oriented performance test for the SAGE positions of Identification Officer and Technician. The primary goals of the present project were to up-date the test and modify it so hat () it could be administered and scored by Air Force personnel and (b) further forms of the test applicable to other SAGE Direction Centers could be constructed by in-service personnel. In order to replicate the job as closely as possible, photographs were made of Situation and Digital Information Displays under actual job conditions. Even though the photographs were made at the Boston Air Defense Sector, the situations were found to be applicable to other sectors. The techniques employed in the construction and modification of the test seem to be useful for the development of similar tests for local needs. The tests were administered and scored with little difficulty by a number of different people, some of these being Air Force personnel. Within the limits of sample size and of the criterion information available, the form of test as modified appeared to be reliable and valid. (Author)

AD-407 573 Div. 23, 5
(TISTB/WA) OTS price $3.60

Psychological Research Associates, Inc.,
Arlington, Va.
SAGE TASK-EQUIPMENT ANALYSIS OVERLAP TECHNICIAN.
May 60, 20p. Rept. 60 21
Contract AF19 604 5616
AFCCDD TN60 4 Unclassified report

Descriptors: *Job analysis, *Psychomotor tests, Reaction (Psychology), Aptitude tests, Decision making, Air Defense Command.

The operation of the Overlap Technician in the Boston Air Defense Sector (BOADS) of the SAGE System is described. The analysis is concerned with delineating the interface between man and machine or, in other terms, describing the relationship between the equipment to be operated and the task of the operators. The present report is one of a series which, ultimately, will cover almost all of the positions in a SAGE Direction Center, and some of the positions in a SAGE Combat Center. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-406 845 Div. 24, 25
(TISTP/JEA) OTS price $1.60

Instrument Corp. of Florida, Melbourne.
LOCATION AND DETERMINATION OF THE LOCATION OF THE ENTRANCE PUPIL (CENTER OF PROJECTION) OF PC-1000 CAMERA IN OBJECT SPACE,
by Duane C. Brown and Ronald G. Davis. 1962, 7p.
SR1
Contract AF19 628 346 Proj. 7600, Task 760006
AFCRL 63 481
Unclassified report

Descriptors: *Ballistic cameras, *Optical images, Lenses, Geometry, Photogrammetry, Optics, Optical properties.

A technical discussion on the location of the entrance pupil (center of projection) of a metric lens is presented and certain misconceptions concerning the relationships between nodal points, the entrance pupil and the center of projection are revealed. Following this, practical techniques for determining the location of the entrance pupil of a lens and the object space coordinates of this point in the field are presented. (Author)

AD-406 884 Div. 24
(TISTM/EJH) OTS price $7.60

Xerox Corp., Rochester, N. Y.
FROSTED PHOTOPLASTIC.
Interim engineering rept. no. 2, 1 Dec 62-31 May 63,
by J. Bickmore, J. Ewing, J. Lenhard, W. Mann, and J. Neyhart. 31 May 63, 67p.
Contract AF33 657 8814
Unclassified report

Descriptors: *Photographic recording systems, *Photographic recording media, *Thermoplastics, Photographic film, Films, Photoreceptors, Photographic images, Electrostatics, Liquids, Photosensitivity, Electric potential, Electrical conductance, Electrical properties, Selenium alloys, Tellurium alloys, Deformation, Silicone plastics, Impurities, Halogenated hydrocarbons, Heating, Photographic equipment, Photographic reconnaissance.

Major accomplishments to date can be summarized as follows: (1) Photoreceptor: The preferred structure is a thin SeTe interface layer on a conductive-glass substrate with a selenium charge-storage overlayer. This plate has shown a resolution capability of 147 lp/mm by xerographic development. Response is roughly panchromatic with efficiency ranging from approximately 60% in the blue-green region of the spectrum to approximately 4% at 8000 angstroms. Sensitivity to daylight exposure is 3 to 6 times that of conventional selenium plates. In preliminary imaging tests using the charge-transfer/frost system, image defects due to photoconductor non-uniformities were undetectable. Several selenium-tellurium plates with closely similar electrical characteristics have been made. (2) Methods: The effects of a number of variables such as time, temperature, film-thickness, etc. on the characteristics of frost development have been determined in sufficient detail to guide in the design of the camera-developer device. (Author)

25. PHYSICS

AD-406 838 Div. 25, 8
(TISTP/MH) OTS price $10.10

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
A SUMMARY OF CURRENT RESEARCH AT THE MICROWAVE RESEARCH INSTITUTE.
Progress rept. no. 23, 1 Oct 62-31 Mar 63, by Ernst Weber. 31 Mar 63, 127p. R452 23 63
Grant AF AFOSR62 295, Task 4751
Unclassified report

Descriptors: *Research program administration, Electromagnetic waves, Plasma physics, Propagation, Solid state physics, Low temperature research, Networks, Reliability, Narrowband, Television systems, Reports.

AD-406 839 Div. 25, 2
(TISTP/MFA) OTS price $3.60

Stanford Electronics Labs., Stanford U., Calif.
DETECTION OF SOLAR PARTICLE STREAMS USING HIGH-FREQUENCY RADIO WAVES,
by B. B. Lusignan. Apr 63, 34p. SEL63 041; TR1403 3
Contract AF19 604 7994, Proj. 7661, Task 76615
AFCRL 62 1122; AFCRL SR2
Unclassified report

Descriptors: *Radio waves, *Charged particles, Propagation, Cosmic rays, Polarization, Solar wind, Moon, Radar, Plasma physics, Radio astronomy, Electric fields, Acceleration, Solar flares, Polarization, Wave transmission, Protons, Doppler effect, Magnetic fields, Motion, Equations, Sensitivity, Inequalities, Measurement, Space probes, Detection.

Interactions between radiowaves and charged particles change their character when the particles have high average velocities. The nature of such interactions is investigated assuming no collisions, no external magnetic field, and low particle densities. A stream of such particles makes the medium anisotropic. As a result the medium propagates two waves of unchanging (characteristic) polarization, one linearly polarized perpendicular to the particle stream and a second at right angles to the first. Such a medium can change the polarization ellipse of a propagating wave. The sun produces such streams radiating outward either in the form of a steady 'solar wind' or in bursts associated with sun spots. Three experiments are suggested to detect the streams by measuring polarization of waves propagated through them. The least sensitive of the three, moon radar, would have measurable effects only during increased solar activity, while the other two--transmission to a deep space probe and observation of polarized cosmic noise sources--show effects even during quiet solar conditions. These sensitivities are based on observations of the proton component of the solar wind. (Author)

AD-406 913 Div. 25
(TISTP/MFA) OTS price $1.10

Arizona State Coll., Flagstaff.
INFRARED ATMOSPHERIC STUDIES.
Final rept., 1 Nov 61-31 Oct 62, by Arthur Adel. May 63, 1p.
Contract AF19 628 301, Proj. 7670, Task76703
AFCRL 63 484 Unclassified report

Descriptors: *Infrared radiation, Wave transmission, Diffraction analysis, Absorption, Line spectrum, Atmospherics.

Two formerly unknown regions of atmospheric transmission, or 'atmospheric windows', have been discovered by the writer in recent times. One of these is the micro-window at 6.3 microns, while the second is a window of major importance, which transmits extraterrestrial radiation from 16 to 24 microns. This report is concerned with extensions of the initial experiments. The atmospheric micro-window at 6.3 microns has been examined with grating resolution. The narrow region of transmission is characterized by ten absorption lines. The net emission of the earth's surface through the atmospheric window from 16 to 24 microns has been observationally compared with the net radiation loss through the principal window between 8 and 14 microns, and found to reach values in excess of 30 percent of the latter. (Author)

AD-406 925 Div. 25
(TISTP/MH) OTS price $1.60

Yale U. Observatory, New Haven, Conn.
INTERACTION OF RADIATION AND MATTER IN A PLASMA,
by Ludwig Oster. Feb 63, 16p.
Contract AF33 657 7271, Proj. 7073, Task 7073 01
ARL 63 62 Unclassified report

Descriptors: *Plasma physics, Emissivity, Absorption, Gas ionization, Magnetic fields, Bremsstrahlung, Cyclotron waves, Refractive index, Thermodynamics, Relativity theory, Shielding, Perturbation, Theory, Electromagnetic waves.

Part of a theoretical investigation of the theory of the emission and absorption of radiation from a fully ionized plasma in the presence of a magnetic field is described. Specifically, the bremsstrahlung radiation and departures from LTE are discussed. (Author)

AD-407 045 Div. 25
(TISTM/EJH) OTS price $3.60

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
NATURE OF THE INTERACTION BETWEEN ELECTRONS AND WELL-DEFINED SURFACES. III. ULTRA-HIGH VACUUM SYSTEM AND SAMPLE OUTGASSING. IV. GAS SOURCE FOR THE ULTRA-HIGH VACUUM STUDY OF ADSORPTION OF KNOWN-GAS LAYERS ON CLEAR SURFACES.
Report for Sep 60-Feb 63,
by E. L. Kern and A. G. Jackson. May 63, 28p.
Proj. 7022, Task 7022 01
ARL 63 80 Unclassified report

Report on Surface and Interface Phenomena of Matter.

Descriptors: *Surfaces, *Degasification, *Vacuum apparatus, *Low-pressure research, Gases, Nitrogen, Liquefied gases, Vacuum pumps, Ionization gases, Calibration, Control panels, Electrons, Cleaning, Laboratory equipment.

The obtaining and maintaining of atomically clean surfaces is a necessary basic step in the study of well characterized surfaces. The initial part of such cleaning is to incorporate the sample and necessary measuring components in an ultra-high vacuum system, capable of maintaining a pressure of 1 x 10 to the -9th power torr (1 torr = 1 mm Hg) to 1 x 10 to the -10th power torr. A double pumping arrangement, using a diffusion pump and a getter pump, with appropriate vapor trapping, valves and gauges, is described; also chamber bakeout and high-frequency heating of metal components. Equipment such as liquid nitrogen and oven controllers, which provide around-the-clock maintenance, is also described. Studies of the influence of known-gas layers on a clean surface

necessitates an ultra-high vacuum gas manifold system. The vacuum pumping, valving, measuring equipment and gas manifold are described. Ion gauges can be calibrated absolutely against a high vacuum McLeod gauge. By this system, capable of 1 x 10 to the -9th power to 1 x 10 to the -10th power torr, partial pressures of gases of the order of 10 to the -12th power torr can be introduced into the main testing chamber. (Author)

AD-407 047 Div. 25, 32
(TISTP/RLG) OTS price $1.50

Naval Research Lab., Washington, D. C.
A FAR INFRARED BIBLIOGRAPHY,
by E. D. Palik. Apr 63, 51p.
NRL Bibliography no. 21
Unclassified report

Descriptors: *Infrared radiation, Instrumentation, Optical properties, Gases, Liquids, Solids, Infrared spectroscopy, Infrared equipment, Bibliographies.

AD-407 049 Div. 25
(TISTP/MFA) OTS price $2.60

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
THE MICROWAVE SPECTRA, STRUCTURE AND DIPOLE MOMENT OF 'CIS' N2F2,
by Robert L. Kuczkowski and E. Bright Wilson, Jr. 1963, 20p.
Unclassified report

Descriptors: *Microwave spectroscopy, *Spectra (Infrared), *Nuclear spins, Nitrogen compounds, Fluorides, Excitation, Nuclear magnetic resonance, Isomeric transitions, Molecular isomerism, Frequency, Standards, Measurement, Vibration, Chemical bonds, Diffusion, Cyanides, Modulation, Electron diffraction analysis, Molecular structure, Dipole moments.

The microwave spectrum of one isomer of F14N14NF and F15N14NF is reported and from this the structure is derived as planar and ''cis'' with the following structural parameters: d(NN) = 1.214 ± 0.005 Angstroms, d(NF) = 1.384 ± 0.01A < FNN = 114.5 ± 0.5 degrees. A dipole moment of 0.18 ± 0.01D has been evaluated from the rotational Stark effect. Transitions of the molecule in an excited vibrational state are reported. From relative intensity measurements of this state, a vibrational frequency of 300 ± 35 reciprocal cm is estimated. A method is demonstrated enabling the ratio of nuclear spin statistical weights of two levels to be determined from the growth rate of their intensity with increasing Stark modulation voltage. (Author)

AD-407 050 Div. 25
(TISTP/RLG) OTS price $1.10

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
MICROWAVE AND MASS SPECTRA OF S2F2.
1963, 14p.
Unclassified report

Descriptors: *Microwave spectroscopy, *Sulfur compounds, Mass spectrum, Spectra (Infrared), Absorption spectrum, Analysis, Distillation, Impurities, Crystal structure, Intensity, Moments, Mass spectroscopy, Fluorides.

The preparation of sulfur monofluoride (S2F2) has been claimed by a number of investigators. More recently an infrared spectrum was assigned to this species. However, doubts have been expressed about the characterization and existence of S2F2. Using methods similar to those of the earlier workers, S2F2 has been prepared and positively identified as S2F2 by means of its mass and microwave spectra. The structure which turns out to be an analogue of the well known SOF2 has also been determined. (Author)

AD-407 053 Div. 25, 6, 10, 12, 27
(TISTP/JEA) OTS price $1.60

Aeronutronic, Newport Beach, Calif.
MIE SCATTERING AND ABSORPTION CROSS SECTIONS OF ALUMINUM OXIDE AND MAGNESIUM OXIDE.
Final rept., Vol. 6,
by Gilbert N. Plass. 27 May 63, 15p.
Contract AF04 695 96, Proj. 4479 730F, Task 447904
SSD TDR62 127 V6 Unclassified report

Report on Infrared Transmission Studies.

Descriptors: *Metals, *Particles, *Electromagnetic waves, Aluminum, Magnesium, Oxides, Refractive index, Exhaust flames, Rocket motors, Particle size, Scattering, Absorption.

The scattering and absorption of electromagnetic radiation by spherical particles of aluminum oxide and magnesium oxide is calculated from the Mie theory. The complex index of refraction was taken from the best available experimental data. Tables of the efficiency factors for scattering, absorption, and extinction are given for particle radii from 0.1 to 5.1 microns and a range of wavelengths from 0.5 to 10 microns. (Author)

AD-407 055 Div. 25, 15
(TISTP/MFA) OTS price $9.10

Illinois U., Urbana.
A NUMERICAL PROCEDURE FOR THE ANALYSIS OF CONTAINED PLASTIC FLOW PROBLEMS,
by G. N. Harper and A. Ang. June 63, 95p.
SR266
Contract DA49 146XZ104
Unclassified report

Doctoral thesis.

Descriptors: *Plasticity, *Stresses, Theory, Deformation, Partial differential equations, Loading (Mechanics), Tensor analysis, Shear stresses, Mathematical models, Numerical analysis, Continuum mechanics.

The development of a systematic numerical procedure for determining the displacements, strains, and stresses within a plane continuum is presented wherein certain regions have been strained beyond an elastic yield limit. Such a procedure should make possible the observation of the development of the stress and strain patterns around regions of high stress intensity. The procedure is restricted to plane, static problems; and the example problems are further restricted to plane strain conditions. The procedure itself is applicable to plane stress problems if the relations between stress and strain for plane stress conditions are substituted for those of plane strain. The material of the continuum is considered to be isotropic and elastic-perfectly-plastic and the problems are solved for continuously increasing external loads. Unloading from a plastically strained state is not considered. The numerical procedure is essentially a relaxation technique applied to a discrete physical model composed of suitably arranged stress points and mass points. Plastic yielding and flow in the solid is characterized by the corresponding yielding and flow of the stress points of the model. (Author)

AD-407 089 Div. 25, 9
(TISTP/MH) OTS price $9.10

Air Force Cambridge Research Labs., Bedford, Mass.
NONLINEAR TRANSMISSION CHARACTERISTICS OF THE PLASMA SHEATH,
by Robert J. Papa. May 63, 99p.
MPL Proj. 4642
AFCRL 63 133 Unclassified report

Descriptors: *Plasma sheath, Plasma physics, Wave transmission, Models, Hypersonic characteristics, Electrons, Temperature, Gas ionization, Numerical methods and procedures, Integration, Reentry vehicles.

A model is constructed of a nonlinear, one-dimensional inhomogeneous multicomponent plasma slab which has the characteristics of the plasma sheath surrounding a typical hypersonic re-entry vehicle at 200,000 ft while traveling at about 18,000 ft/second. A plane wave incident upon the slab at arbitrary angle can induce changes in electron temperature without affecting the neutral gas temperature. The variations of electron temperature produce changes in collision frequency and the rate coefficients describing the various electron production and loss mechanisms. Such changes cause alterations in the effective dielectric constant of the medium. On the basis of a model of a plane-layered medium composed of a stack of linear homogeneous sheets, the reflection and transmission coefficients of the nonlinear slab may be computed by a step-by-step numerical integration of Maxwell's equations expressed in the form of difference equations. (Author)

AD-407 110 Div. 25
(TISTP/MH) OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
SPACE PHYSICS PROGRAM.
Semiannual technical note, 1 July-31 Dec 62.
30 Apr 63, 1v. TDR169 3260TN1
Contract AF04 695 169
SSD TDR63 77
Unclassified report

Descriptors: *Space environmental conditions, Atmosphere gases, Night sky, Aurorae, Electromagnetic waves, Electrons, Protons, Nuclear particles, Optical properties, Satellites, Infra-red radiation, Ultra violet radiation, Physics.

A number of experimental techniques were developed and employed in making measurements of the near-earth space environment from Program 162 satellites. These measurements include the identification of the fluxes and energy spectra of trapped protons and electrons in the region of space from 200-700 km and provide the first positive identification that the artificial radiation belt was produced from bomb electrons. Radiometric measurements were also made of the earth's background radiance in the near infrared and middle ultraviolet regions of the spectrum. Data are being analyzed to determine the vertical distribution of ozone in the atmosphere, as inferred from measurements of the attenuation of radiation in the middle ultraviolet due to absorption by the oxygen-3 molecule. Airglow experiments were conducted to study the 5577A green and the 6300A red lines of atomic oxygen. (Author)

AD-407 150 Div. 25
(TISTM/ODN) OTS price $1.60

Cornell U., Ithaca, N. Y.
RESEARCH ON NEW SOLID STATE DEFECT STRUCTURES BASED ON WO3 AND ON V2O5.
Final rept.,
by M. J. Sienko. 30 Sep 62, 12p.
Contract AF49 638 191
Unclassified report

Descriptors: *Abstracts, *Vanadium compounds, *Tungsten compounds, Bronze, Impurities, Magnetic properties, Electrical conductance, Silver, Lithium, Copper, Nuclear magnetic resonance, Potassium, Electrical properties, Solid state physics, Oxides.

AD-407 276 Div. 25
(TISTM/ODN) OTS price $4.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
THE CRYSTALLOGRAPHY OF IMPURITY ADSORPTION ON COPPER SURFACES,
by W. M. Robertson and P. G. Shewmon. 1963, 31p.
Contract Nonr 76019
Unclassified report

Doctoral thesis.

Descriptors: *Copper, *Adsorption, *Impurities, *Metallic crystals, Measurement, Surfaces, Torque, Low-pressure research, Hydrogen, Hydrogen compounds, Sulfides, Thermodynamics, Water vapor, Experimental data, Energy, Oxygen, High-temperature research.

The object of the investigation was to determine the sites at which impurity adsorption occurs on crystalline surfaces. This was done by measuring the variation of surface free energy with orientation. A relation between the torque, chemical potential, surface excess, and orientation was derived. Methods are discussed for determining surface torques by measuring dihedral angles at grooves where twin boundaries and grain boundaries intersect surfaces. Measurements were made of relative torques, on copper surfaces for the range of oxygen pressures of 10 to the -22 to 10 to the -13 power atmosphere at 1000 C using water-hydrogen mixtures. Increasing oxygen pressure was found to increase the magnitude of the torque on the (111) and (100) orientations. This indicates preferential adsorption at a range of orientations on the smooth, low index (100) and (111) surfaces rather than on stepped surfaces of orientations different from the low index orientations. A calculation based on a simple model of the surface indicates that about a half monolayer of oxygen atoms is adsorbed on the (111) surface. Measurements of torques after annealing in an atmosphere containing hydrogen sulfide showed that sulfur adsorption decreases the torque near (100) while not affecting that near (111). (Author)

AD-407 305 Div. 25
(TISTP/RLG) OTS price $4.60

Frick Chemical Lab., Princeton U., N. J.
VIBRATION - ROTATION SPECTRA OF CH_4 AND CD_4 IMPURITIES IN XENON, KRYPTON AND ARGON CRYSTALS,
by A. Cabana, D. F. Hornig and G. B. Savitsky.
June 63, 1v. TR15
Contract Nonr185827, Proj. NR014 203
Unclassified report

Descriptors: *Cryogenics, *Crystals, *Carbon compounds, Vibration, Rotation, Solidified gases, Xenon, Krypton, Argon, Solids, Symmetry (Crystallography), Crystal lattice defects,

Chemical bonds, Diffusion, Atomic energy levels, Atomic spectroscopy, Solutions, Absorption, Intensity, Crystal lattices, Spectra (Infrared), Impurities, Hydrogen compounds.

The infrared spectra of CH_4 and CD_4, present as substitutional impurities in crystals of argon, krypton and xenon, were studied at temperatures ranging from 5 to 40 K. Both nu3 and nu4 of CH_4 in xenon showed a simple four line pattern which is consistent with that expected for slightly hindered rotor. In krypton and argon a fifth line appeared on nu3, as expected from King's theoretical calculations for a tetrahedral rotor in an octahedral field. In addition, argon showed absorption due to pairs of higher aggregates of CH_4 molecules. (Author)

AD-407 333 Div. 25
(TISTP/RLG) OTS price $1.60

Naval Postgraduate School, Monterey, Calif.
INVESTIGATION OF THERMAL NEUTRON FLUX PERTURBATION IN A POLYETHYLENE MEDIUM BY USE OF GOLD FOIL DETECTORS,
by Edward C. Copeland and Roger L. Reasonover, Jr. 1961, 31p.
AEC NP12662 Unclassified report

Master's thesis.

Descriptors: *Thermal neutrons, *Thermal reactors, *eactor moderators, *Detectors, *Foils, Data, Theory, Reactor theory, Reactor cores, Graphite moderated reactors, Reaction kinetics, Spectrum analyzers, Gamma ray spectra, Equations, Reactor lattice parameters, Analysis, Thickness, Water, Research reactors, Corrections, Calibration, Determination, Fluxes, Homogeneous reactors, Polyethelene plastics, Perturbation theory, Gold.

The neutron flux perturbation in a homogeneous thermal reactor, polyethylene moderated, was investigated experimentally through use of activated gold foils of varying thicknesses. The experimental data are compared with the theoretical predictions of Bothe and Skyrme, and with the modifications introduced by Tittle and by Ritchie and Eldridge. Experimental determination of the thermal neutron flux at the center of the core of the AGN-201 reactor indicates that Skyrme's theory and/or Skyrme's theory as modified by Ritchie and Eldridge give the best results over a range of foil thickness from two to ten mils. The greatest deviation of theoretical calculations from experimental data is less than 3%. Determinations of other investigators for gold detectors in graphite agree to within 3% with the predictions of the Skyrme theory. In water-moderated reactors experimental determinations were compared with the Skyrme theory as modified by Ritchie and Eldridge and found to agree to 5%. (Author)

AD-407 339 Div. 25, 30
(TISTP/RLG) OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
MAGNETIC INSULATION EXPERIMENTS WITH A TRAVELING MAGNETIC PISTON PLASMA ACCELERATOR,
by Glenn C. Light, 8 May 63, 37p.
TDR169 3210 05 TN2
Contract AF04 695 169
SSD TDR63 72 Unclassified report

Descriptors: *Betatrons, *Magnetic fields, Experimental data, Boundary layer, Attenuation, Kerr cells, Hydrogen, Propagation, Acceleration, Discharge tubes, Gas flow, Shock waves, Velocity, Analysis of variance, Capacitors, Motion, Deceleration, Transmission lines, Particle accelerators, Plasma physics, Shock tubes.

Further experimental work on a traveling magnetic piston plasma accelerator is reported. This accelerator produces a shock wave traveling at 110,000,000 cm/sec. Since the effective length of the piston is of the same order as the ideal length of uniform plasma, the plasma will expand to fill the tube cross section when the piston stops; this will produce a non-uniform slug even if there is no loss of plasma. In an attempt to inhibit the flow to the boundary layer, a uniform axial magnetic field was put on the shock tube. This applied magnetic field also alters the piston as well as the plasma leakage through the piston. The data indicate that for certain orientations and strengths of axial magnetic field, the attenuation of shock wave velocity beyond the exit of the accelerator is markedly reduced. (Author)

AD-407 346 Div. 25
(TISTP/HSS) OTS price $6.60

AVCO Everett Research Lab., Everett, Mass.
INVESTIGATION OF THE EFFECTS OF HIGH INTENSITY ELECTROMAGNETIC WAVES ON THE TRANSPORT PROPERTIES AND PHENOMENA OF IONIZED GAS AT ELEVATED TEMPERATURES.
Final rept.
Apr 63, 59p.
Contract AF19 604 7458, Proj. 5561, Task 556112
AFCRL 63 127 Unclassified report

Descriptors: *High temperature research, *Plasma physics, Electromagnetic waves, Gas ionization, Ionization, Shock tubes, Heat transfer, Atomic properties, Gas discharges, Shock waves, Transport properties.

A theoretical and experimental study is presented of the transport properties and phenomena of ionized gases at elevated temperatures. (Author)

AD-407 352 Div. 25
(TISTP/GRW) OTS price $4.60

University of Southern Calif., Los Angeles.
THEORETICAL INVESTIGATIONS IN SOLID STATE PHYSICS USING DISPERSION RELATION TECHNIQUES.
Final technical rept.,
by Peter Kraus and C. J. Pearson. May 63, 39p.
Contract AF33 616 7781, Proj. 7885, Task 788503
ARL 63 76 Unclassified report

Report on Research in Solid State Physics.

Descriptors: *Solid state physics, *Nuclear scattering, Functional analysis, Particles, Partial differential equations, Bessel functions, Momentum, Theory, Numerical analysis.

Some properties of Jost functions are reviewed for real and complex angular momentum and compared to the determinantal expansion. The exact phase shifts and Jost functions in the complex k-plane are calculated for S- and P-waves and compared to the first and second order determinantal expansion. (Author)

AD-407 382 Div. 25, 15
(TISTP/HSS) OTS price $3.60

RAND Corp., Santa Monica, Calif.
THE DYNAMICS OF DISCONTINUITY SURFACES IN GENERAL

RELATIVITY THEORY,
by Dominic G. B. Edelen and T. Y. Thomas.
June 63, 29p. Memo. no. RM3627 RC
Unclassified report

Descriptors: *Relativity theory, Dynamics, Theory, Quantum mechanics, Field theory, Continuum mechanics, Surfaces.

A system of necessary conditions is obtained for the existence of solutions of the Einstein field equations in the presence of jumps on sigma. These conditions are shown to be expressible in terms of surface tensors and surface tensorial differential systems. (Author)

AD-407 408 Div. 25, 15
(TISTP/MH) OTS price $3.60

Vitro Labs., Silver Spring, Md.
SYMMETRIC VIBRATION OF THE ELASTIC SOLID CYLINDER.
Technical rept., 22 Mar-14 Dec 62,
by Donald S. Moseley. 14 Dec 62, 82p.
TN1734 01 1
Contract AF49 638 1148
AFOSR 4650 Unclassified report

Descriptors: *Elasticity, Resonance, Frequency, Solids, Mechanical waves, Isotropism, Phase measurement, Propagations, Vector analysis, Deformation, Stresses, Cylindrical bodies.

The exact formulation of displacements and resonant frequencies of an elastic solid cylinder was attempted. Progress was made, but the principal objective was not reached. This report traces the course of work through the early demonstration of invalidity of a formulation that was postulated prior to the contract, and through several assaults upon the problem. Novel solutions of the wave equation for radially symmetric displacements were discovered. A section is devoted to the recommended direction of future work. (Author)

AD-407 419 Div. 25, 14
(TISTM/ODN) OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
MECHANISM OF WATER ABSORPTION IN GLASS-REINFORCED PLASTICS.
Quarterly rept. no. 3, 1 Jan-1 Apr 63,
by D. W. McNeil, Bailey Bennett, and R. I. Leininger. 1 Apr 63, 19p.
Contract NObs86871, Proj. SR007 03 04, Task 1008
Unclassified report

Descriptors: *Composite materials, *Plastics, *Glass textiles, *Filament wound construction, Water, Epoxy plastics, Mechanical properties, Diffusion, Degradation, Electron microscopy, Cylindrical bodies, Moisture, Absorption (Physical), Reinforcing materials.

It was observed that prolonged exposure of glass-reinforced plastics to water is usually accompanied by a resulting deterioration in their mechanical properties. Activity was primarily directed toward obtaining diffusion measurements of several hydrophilic polymers. These measurements, on model systems, will later be compared with similar values obtained at high pressures in order to establish the role of hydrostatic variables in the diffusion of a liquid into a solid polymer. The weight-gain experiments indicate that diffusion phenomena in water-epoxy resin systems are essentially unaffected by hydrostatic pressures up to 10,000 psi. Studies included electron-microscope and mechanical evaluations of glass-reinforced epoxy cylinders. Research with the electron microscope indicated that high pressures may be the cause of flaws and other imperfections which allow the immersion medium to come into contact with the fibers below. As a result, the moisture may penetrate along the resin-glass bond and cause a decrease in flexural strength. Mechanical tests are being utilized to confirm this latter effect. Mechanical tests on neat resin specimens show them to be much less sensitive to water absorption than the same resin reinforced with glass. (Author)

AD-407 429 Div. 25
(TISTP/AW) OTS price $1.60

Naval Research Lab., Washington, D. C.
SOLVENT-INDUCED EFFECTS ON INFRARED SPECTRA,
by R. E. Kagarise. 24 May 63, 14p.
Proj. RR001 02 42
NRL Rept. 5906 Unclassified report

Descriptors: *Frequency shift, *Molecular spectroscopy, Solvents, Theory, Infrared spectroscopy, Band spectrum, Molecular association, Chemical bonds, Organic solvents, Experimental data.

The historical development of theories for solvent-induced IR frequency shifts is given and several of these theories are then examined in the light of accurate experimental data. The bulk dielectric theory of Buckingham predicts that the ratio of the integrated intensity of an absorption band and the square of its frequency is an isotopic invariant. This prediction is checked using the C-H and C-D stretching bands of CHC13 and CDC13; CHC12Br and CDC12Br; and CHBr3 and CDBr3. Ratios of 1.73, 1.54, and 1.20, respectively, are observed. These values are in significant disagreement with the predicted value of unity. Bellamy-type plots are constructed for the C=O vibrations of a number of solutes and, in general, the resulting curves do not pass through the origin as predicted. Theoretical band contours resulting from two overlapped bands are computed for various band maxima separations, and the effect of intensity change of the individual bands on the shape of the resultant contour is discussed. These theoretical predictions are then applied to the interpretation of a number of mixed solvent studies which show the complexity of most solvent-solute interactions. Finally, these techniques are applied to the 750 reciprocal cm band of tetralin and the 680 reciprocal cm band of benzene which are unusual bands in that they show a blue-shift with increasing solvent polarity. (Author)

AD-407 466 Div. 25, 2
(TISTP/MFA) OTS price $3.00

Metals and Ceramics Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
Q VALUES FOR INDEXING X-RAY POWDER PATTERNS ACCORDING TO ITO.
Final rept., Sep 61-Mar 63,
by R. L. Prickett. Apr 63, 192p.
Proj. 7353, Task 735302
ASD TDR63 276 Unclassified report

Report on Characterization of Solid Phase and Interphase Phenomena in Crystalline Substances.

Descriptors: *Symmetry (Crystallography), *Crystals, Tables, Measurement, Programming (Computers), X-ray diffraction analysis, Crystal structure.

A comprehensive table of Q values for all common

interplanar spacings was set up to assist in indexing X-ray powder patterns by the Ito method. An IBM 7090 computer was used to calculate the data. (Author)

AD-407 467 Div. 25
(TISTM/BRW) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
NEW TECHNIQUE FOR MEASUREMENT OF ELECTRON DIFFRACTION PATTERNS OF POLYCRYSTALLINE MATERIALS,
by J. H. Richardson and R. F. Schneidmiller.
18 June 63, 13p. Rept. no. TDR169 3240 30TN1
Contract AF04 695 169
SSD TDR63 83

Unclassified report

Descriptors: *Crystals, Photographic enlargers, Display systems, Crystal structure, Measurement, Electron diffraction analysis.

A technique for the measurement of electron diffraction patterns of polycrystalline materials is described. The image of the diffraction pattern is projected by a photographic enlarger at a predetermined magnification onto a chart that is calibrated directly in d spacings. This technique is rapid, as no calculations are involved. Accuracy is equal to, or better than, that achieved with the classical method. (Author)

AD-407 470 Div. 25
(TISTP/MFA) OTS price $5.60

Cornell U., School of Electrical Engineering, Ithaca, N. Y.
THE CURRENT DISTRIBUTIONS IN A VELOCITY-MODULATED BRILLOUIN-FOCUSED ELECTRON BEAM,
by A. S. Gilmour, Jr. and L. F. Eastman.
20 Oct 62, 49p. RR no. EE546; TR no. 23
Contract AF30 612 2573

Unclassified report

Descriptors: *Electron beams, Electron guns, Electric fields, Plasma physics, Wave transmission, Fourier analysis, Circuits, Velocity, Modulation, Harmonic analyzers, Radio waves, Cathodes (Electron tubes), Brillouin zones.

Radio-frequency current distributions in a Brillouin-focused electron beam that has been velocity-modulated by a gridless-gap cavity are described. A review is presented of the small-signal theory of ideal Brillouin beams in addition to small- and large-signal experimental results. An approximation is made to predict the RF current contours in a Brillouin beam whose d-c current-density profile resembles a trapezoid. The predictions of this theory are found to agree well with actual beam behavior in that both the thickness and the amplitude of the RF current density ring around the beam vary with the depth of modulation alpha when alpha is very small. The large-signal results show that an average nonlinear force is present, which causes the average diameter of the modulated beam to be smaller at some axial positions than the diameter of the d-c Brillouin beam. In addition, the large-signal results show that at least two-second- and two third-harmonic waves are present on the beam. One of these in each case is the component arising from the square-wave current-density wave at the edges of the beam. The other wave in each case is thought to have arisen from the nonlinear drive in the high alternating fields in the cavity gap. (Author)

AD-407 484 Div. 25, 14
(TISTM/TCG) OTS price $2.60

Polymer Research Inst., U. of Mass., Amherst.
BIREFRINGENCE OF POLYOLEFINS,
by S. Hoshino, R. S. Stein, and K. Sasaguri.
31 Dec 62, 9p. TR55
Contract Nonr335701, Proj. NR356 378

Unclassified report

Descriptors: *Polyethylene plastics, *Crystal structure, Polymers, Aging (Materials), Heat treatment, Elasticity, Mechanical properties, Optical properties, Spectra (Infrared), X-ray diffraction analysis, Nuclear magnetic resonance, Temperature, Relaxation time, Refractive index, Stresses.

Contents:
Birefringence measurements
Density and crystallinity
X-ray study and IR spectrum
Mechanical properties
Temperature dependency
Polybutene-1 and polypropylene
Polyethylene and polypentene

AD-407 485 Div. 25, 4
(TISTM/ODN) OTS price $1.60

Boston U., Mass.
CRYSTAL STRUCTURE STUDIES OF MATERIALS FOR POTENTIAL USE IN SOLAR ENERGY CONVERSION,
Final rept.,
by Klaas Eriks. 30 Apr 63, 10p.
Contract AF19 604 5995, Proj. 6694, Task 66945
AFCRL 63 606

Unclassified report

Descriptors: *Complex compounds, *Crystal structure, *Crystals, *Solar radiation, Aluminum compounds, Borides, Ammonium compounds, Tungsten compounds, Boron compounds, Chlorides, Boranes, Perchlorates, Sulfoxides, Determination, X-ray diffraction analysis, Materials.

X-ray structural studies of six different substances are described: aluminum dodecaboride, ammonium 12-tungstocobaltocobaltiate, pyridine-boron trichloride, trimethylphosphine borane, pararosanilin perchlorate, and cobaltous chloride-dimethylsulfoxide. Not all six studies are finished. Pyridine-BC13 exhibits an interesting B - N interatomic distance. Pararosanilin perchlorate possesses a carbonium ion structure with planar, sp2 hybridized configuration around the central carbon atom and quinoid structure for the benzene rings. Trimethylphosphine borane exhibits molecular rotation in the solid. The heteropoly salt contains the Keggin configuration in the anion. (Author)

AD-407 498 Div. 25, 14, 10
(TISTM/TCG) OTS price $3.60

RAND Corp., Santa Monica, Calif.
THE THERMODYNAMICS OF THE POLYETHYLENE-HYDROCARBON VAPOR SYSTEM,
by F. J. Krieger. July 63, 28p. Memo. no. RM3709PR
Contract AF49 638 700

Unclassified report

Report on Project RAND.

Descriptors: *Polyethylene plastics, *Aliphatic compounds, *Organic compounds, Chemical equilibrium, Phase studies, Gases, Solids, Carbon, Enthalpy, Entropy, Molecular weight, Temperature, Pressure, Tables, Equations of state, Vapors, Thermodynamics.

The purpose of this study is the thermodynamic investigation of polyethylene over a range of temperatures up to 6000 K and pressures up to 10 to the 6th power atm. Two sets of equilibrium composition equations are used; one representing

a pure gas phase, the other a heterogeneous system of gas and solid carbon. The gas phase of the heterogeneous chemical system, like the homogeneous gas phase, comprises 70 gaseous carbon and hydrocarbon species. The results of the computational program are presented in both tabular and graphic form. The latter is a conventional Mollier diagram in which specific enthalpy is plotted against specific entropy, with cross plots of temperature, pressure, and molecular weight. (Author)

AD-407 521 Div. 25, 6, 4, 7
(TISTP/JEA) OTS price $2.75

Lockheed Aircraft Corp., Sunnyvale, Calif.
ELECTROLUMINESCENCE: AN ANNOTATED BIBLIOGRAPHY,
comp. by Peter R. Stromer. Jun 63, 117p. Rept. no. SB63 6; 6 90 63 6
Unclassified report

Descriptors: *Electroluminescence, *Bibliography, Injection, Phosphorus, Electric fields, Photons, Excitation, Display systems, Computer logic, Cathode ray tube screens, Chemical compounds, Photoconductivity, Sonar, Optical properties, Phosphorescence, Direct current, Alternating current.

The recent literature of carrier injection (D.C.) and intrinsic (A.C.) electroluminescence has been reviewed. Electroluminescence is defined as the excitation of a phosphor by an electric field whereby the electrical energy is converted to visible radiation. Other forms of energy such as photons, cathode rays, x-rays, etc. give rise to photoluminescence, cathodoluminescence, and x-ray luminescence, respectively. References to these other forms of luminescence have been included only in those instances where they have been studied in combination with electroluminescence. Entries are arranged alphabetically by senior personal author. Both a source and subject index are supplied to provide different approaches to the use of this material. (Author)

AD-407 544 Div. 25
(TISTP/RLG) OTS price $7.60

Nevis Cyclotron Lab., Columbia U., Irvington-on-Hudson, N. Y.
RESONANT PHENOMENA IN STRANGE-PARTICLE PRODUCTION,
by Uriel Nauenberg. May 63, 71p. Rept. no. R363; Nevis 112; CU218
Unclassified report

Doctoral thesis.

Descriptors: *Strange particles, *Nuclear physics, Pions, Nuclear structure, Experimental data, Nuclear spins, Optical scanning, Hydrogen compounds, Measurement, Functional analysis, Radioactive decay, Particle accelerators, Nuclear energy levels, Analysis, Particle beams, Carbon compounds, Nuclear cross sections, Mass-energy relation, Theory, Production, Parity, Resonance, Nuclear reactions.

AD-407 545 Div. 25, 2
(TISTP/HSS) OTS price $1.60

Nevis Cyclotron Lab., Columbia U., Irvington-on-Hudson, N. Y.
INTENSITY OF UPWARD MUON FLUX DUE TO COSMIC RAY NEUTRINOS PRODUCED IN THE ATMOSPHERE,
by T. D. Lee, H. Robinson, M. Schwartz, and R. Cool. June 63, 16p. Rept. R367; NEVIS115; CU221
Contract AT30 1 1932
Unclassified report

In cooperation with Brookhaven National Lab., Upton, N. Y.

Descriptors: *Muons, *Neutrinos, Cosmic rays, Nuclear physics, Nucleons, Mesons, Quantum mechanics, Nuclear particles, Atmosphere, Heavy bosons.

Calculations were performed to determine the upward-going muon flux leaving the earth's surface after having been produced by cosmic ray neutrinos in the crust. Only neutrinos produced in the earth's atmosphere are considered. Rates of the order of one per 100 sq m per day might be expected if an intermediate boson exists and has a mass less than 2 bev. (Author)

AD-407 556 Div. 25, 17
(TISTM/TCG) OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
EFFECT OF STRESS ON THE LUDERS BAND VELOCITY IN LOW CARBON STEELS,
by Hans Conrad. 4 June 63, 7p. Rept. no. TDR169 3240 11 TN9
Contract AF04 695 169
SSD TDR 63 127 Unclassified report

Descriptors: *Steel, *Stresses, Deformation, Reaction kinetics, Shear stresses, Enthalpy, Equations, Dynamics.

The Luders band propagation rate, s sub L, in low carbon steel can be considered to obey the relation, s sub L = s sub zero exp-(H(Tau)/kT) where s sub zero is approximately a constant, and H(Tau) is the activation energy of the process, and represents a decreasing function of the effective stress, Tau (given by the difference between the applied stress and the long-range internal stress). Available data on the effect of stress on Luders band velocity is correlated on the basis of this relationship. The fact that the activation volume derived from this correlation is independent of structure, and is the same as that for dislocation mobility and other deformation phenomena in iron and steel, suggests that the rate-controlling mechanism is thermally-activated overcoming of the Peierls-Nabarro stress. (Author)

AD-407 559 Div. 25
(TISTP/MH) OTS price $2.60

Nevis Cyclotron Lab., Columbia U., Irvington-On-Hudson, N. Y.
PRECISION LIFETIME MEASUREMENT ON POSITIVE AND NEGATIVE MUONS,
by S. L. Meyer, E. W. Anderson, E. J. Bleser, L. M. Lederman and J. L. Rosen. May 63, 24p. Rept. no. NEVIS 114:R366:CU220
Contract Nonr26672
Unclassified report

Descriptors: *Muons, Decay schemes, Charged particles, Life expectancy, Synchrotron, Cyclotrons, Liquefied gases, Hydrogen, Antiparticles, Pions, Nuclei, Helium, Radioactive day.

An experiment to measure and compare the free decay rates of positive and negative muons is described. Muons from the Nevis Synchrocyclotron were stopped in a liquid hydrogen target containing less than 1 ppm of deuterium and less than 1 part in 1 billion of other impurities. In this situation, the rate of negative muon capture in hydrogen was the only significant correction to the free decay rate of negative muons and was measured in a separate experiment. The lifetimes were monitored by measuring the

time intervals between muon stops and decay electrons using a transistorized digitron of 30 nsec channel width. Electronic circuitry of the ''interference remover'' type was employed to eliminate time-dependent background. Negative and positive muon lifetimes were measured with the same apparatus and under essentially the same conditions of rate and geometry. The ratio of the lifetimes is expected to be particularly insensitive to any systematic errors. (Author)

AD-407 563 Div. 25, 14
(TISTM/REB) OTS price $3.60

RAND Corp., Santa Monica, Calif.
THE THERMODYNAMICS OF THE POLYSTYRENE-HYDROCARBON VAPOR SYSTEM,
by F. J. Krieger. July 63, 28p. RM3708PR
Contract AF49 638 700
Unclassified report

Descriptors: *Styrene plastics, *Hydrocarbons, High-temperature research, High-temperature research, Tables, Data, Enthalpy, Entropy, Molecular weight, Thermodynamics.

A study was conducted on the thermodynamic properties of polystyrene over a range of temperatures up to 6000 K and pressures up to 10 to the 6th power atmospheres. Two sets of equilibrium composition equations are used; one representing a pure gas phase, the other a heterogeneous system of gas and solid carbon. The gas phase of the heterogeneous chemical system, like the homogeneous gas phase, comprises 70 gaseous carbon and hydrocarbon species. The results of the computational program are presented in both tabular and graphic form. The latter is a conventional Mollier diagram in which specific enthalpy is plotted against specific entropy, with cross plots of temperature, pressure, and molecular weight. (Author)

AD-407 566 Div. 25
(TISTP/RLG) OTS price $1.10

Naples U., (Italy).
CALCULATION OF BAND STRUCTURE OF COMPLEX CRYSTALS BY THE ELECTRON NETWORK MODEL,
by G. Della Riccia. July 62, 4p.
Contract AF61 052 434
AFOSR 4597
Unclassified report

Descriptors: *Crystal Lattices, *Electrons, *Symmetry (Crystallography), Numerical analysis, Special functions, Potential theory, Vector analysis, Equations, Diamonds, Chemical bonds, Networks, Crystal structure, Mathematical models, Crystals.

The method of the electron in a network lattice allows one to calculate the complete band structure of a complex crystal. One establishes explicitly a particular equation for each set of bands of the same type of symmetry. Besides the simplicity of the calculation, an advantage of such method is the possibility of taking easily into account the influence of the atoms which are not merely the first neighbors, and the fact that the lattice potentials appear in the equations only as Dirac's functions. (Author)

AD-407 567 Div. 25
(TISTP/RLG) OTS price $3.60

Aeronutronic, Newport Beach, Calif.
ELECTRON-ION REACTION RATE THEORY. DETERMINATION OF THE PROPERTIES OF NON-EQUILIBRIUM PLASMAS IN MHD GENERATORS AND ACCELERATORS AND IN SHOCK TUBES,
by Stanley Byron, Paul I. Bortz, and Gary R. Russell. 1963, 33p.
Contract AF49 638 670
AFOSR 4631
Unclassified report

Descriptors: *Nuclear reactions, *Electrons, *Plasma physics, *Magnetohydrodynamics, Reaction kinetics, Particle accelerators, Analysis, Temperature, Thermionic emission, Absorption, Radioactive decay, Measurement, Nuclear energy levels, Electrical conductance, Nuclear particles, Shock tubes, Excitation, Nuclear cross sections, Gases, Recombination reactions, Integration, Transition temperature, Equations, Inelastic scattering, Theory, Ions, Electron density, Generators.

The theoretical analysis required to determine the electron density, electron temperature, excited state populations and radiation emission of monatomic plasmas is described. Available information on inelastic cross-sections and radiative emission and absorption is reviewed. The range of physical parameters over which various non-equilibrium effects are significant is examined. Examples of the application of this theory to the non-equilibrium magnetohydrodynamic generator, the crossed-field accelerator and the shock tube are presented. (Author)

AD-407 600 Div. 25
(TISTP/RLG) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
INVESTIGATION OF CRYSTAL GROWTH PROCESSES. Final rept.,
by W. J. Fredericks, F. E. Rosztoezy and J. Hatchett. 15 Jan 63, 24p.
Contract AF49 638 999
AFOSR 4731 Unclassified report

Descriptors: *Crystal growth, *Potassium compounds, *Purification, Crystals, Spectroscopy, Zone melting, Ions, Symposia, Temperature, Measurement, Optical scanning, Electrical conductance, Data, Photoelectric effect, Solvents, Pressure, Solubility, Analysis, Chlorides, Ion exchange.

A method for purification of KC1 by anion and cation exchange was developed. The crystalline product of the purification process and single crystals grown from this product were evaluated. This investigation shows that the method produces crystals superior to those currently available commercially. Optical data indicate the OH(-), Br(-), and I(-) concentration was reduced. Emission spectroscopy indicates the Na(+) content was significantly reduced. Electrical conductivity measurements indicate that the divalent-ion concentration is comparable to that of 10-pass zone-refined material if compensation does not occur in either case. This work was reported at the 1962 International Color Symposium in Stuttgart, Germany. An attempt was made to grow crystals from an H2S solvent at high temperatures and pressures. To date these results have not met with success, but measurements of solubility show that it is a possible method for growing CdS and ZnS. (Author)

AD-407 610 Div. 25
(TISTP/RLG) OTS price $11.00

University Coll., London (Gt. Brit.).
DETERMINATION OF PION-NUCLEON PARAMETERS AND

PHASE SHIFTS BY DISPERSION RELATIONS,
by J. Hamilton. 14 Jan 63, 120p. Technical note no. 11
Grant AFEOAR 63 3
AFOSR 4744 Unclassified report

Descriptors: *Reactor lattice parameters, *Pions, *Phase studies, *Nuclear scattering, Resonance scattering, Nuclear resonance, Momentum, Nuclear energy levels, Nuclear reactions, Wave transmission, Relativity theory, Charged particles, Theory, Nuclear physics, Data, Wave analyzers, Series, Errors, Electromagnetic waves, Recoil atoms, Mechanics, Polynomials, Absorption, Determination, Nucleons, Phase shifters, Nuclear cross sections.

An account is given of the use of dispersion relations to determine the parameters of low energy pion-nucleon physics (f squared, the s- and p-wave scattering lengths and certain other constants) and the determination of the s- and p-wave phase shifts up to a few hundred mev. (Author)

AD-407 612 Div. 25
(TISTP/RLG) OTS price $1.10

Illinois U., Urbana.
(No title).
Final summary rept.
11 Feb 63, 2p.
Grant AFOSR 62 250
AFOSR 4812 Unclassified report

Descriptors: *Microwaves, *Microwave equipment, Liquids, Dielectrics, Carbon compounds, Sulfides, Microwave frequency, Detection, Optical instruments, Measurement, Kerr cells, Temperature, Lasers, Photomultipliers, Neodymium, Electron multipliers, Modulation, Light.

AD-407 666 Div. 25, 15
(TISTP/FEM) OTS price $2.60

Royal Coll. of Science and Technology, Glasgow (Gt. Brit.).
THE NUMERICAL SOLUTION OF THE SINGULAR INTEGRAL EQUATION FOR DIFFRACTION BY A SOFT STRIP.
Final technical rept., pt. 2.
July 62, 19p.
Grant AF EOAR 61 49
AFOSR 4773 pt. 2 Unclassified report

Descriptors: *Diffraction, *Scattering, Partial differential equations, Integral equations, Functions, Trigonometry, Numerical analysis, Geometric forms.

It is difficult to obtain practical solutions for the scattering of waves by obstacles when the dimensions of the obstacle are comparable with the wavelength. It is shown that numerical solution of the integral equation for diffraction by a two-dimensional strip gives accurate results in this awkward range of wavelengths. A variational principle is used, with a comparatively simple step-function approximation to the unknown function in the integral equation. The results obtained justify further investigations to see whether the method can deal with diffraction by objects of more complicated shape. (Author)

AD-407 669 Div. 25
(TISTP/RLG) OTS price $1.60

Hebrew U. (Israel).
SIMULTANEOUS DIFFRACTION IN ANTHRACENE,
by Leonard Cohen, Benjamin S. Fraenkel and Z. H. Kalman. Jan 63, 8p. Technical rept. no. 2
Contract AF61 052 222
AFOSR 4732 Unclassified report

Descriptors: *X-ray diffraction analysis, *Carbon compounds, Indexes, Analytic geometry, Vector analysis, Matrix algebra, Special functions, Theory, Germanium, Crystal lattices, Algebraic topology, Spheres, Reflection, Monochromatic light, Symmetry (Crystallography), Hydrogen compounds.

An analytical method is used to index the (100) simultaneous diffractions in (monoclinic) anthracene. The expected pattern of diffractions is calculated and compared with experimental observations. The computations are amenable to desk calculators. Simultaneous diffractions from 23 different pairs of planes are identified and tabulated for anthracene using copper K alpha radiation. (Author)

AD-407 671 Div. 25
(TISTP/FEM) OTS price $2.60

Alabama U., University.
STUDIES OF SOLIDS AT LOW TEMPERATURES.
Final technical rept.
8 Apr 63, 23p.
Grant AF AFOSR 61 43
AFOSR 4710 Unclassified report

Descriptors: *Low temperature research, *Resonance, *Free radicals, Stability, Deuterated compounds, Crystals, Spectrum analyzer, X-band, Crystal structure, Rotation, Frequency shift, Phosphates, Potassium, Absorption spectrum, Hydrogen, Raman spectroscopy, Chlorine, Bromine, Spin, X-rays.

Radical species which are stable only at low temperatures are investigated by electron spin resonance and optical methods. The initial compound chosen for study was KH2PO4, the deuterated compound also being included in this investigation. 50-kv x-rays produce free radicals in this compound which appear to be completely stable at liquid air temperatures, but decay rapidly above about 140K. Complete orientation data were taken on this compound about all three crystallographic axes for both undeuterated and deuterated crystals. (Author)

AD-407 680 Div. 25
(TISTP/MH) OTS price $3.60

California U., Los Angeles.
STATUS AND PROGRESS.
Final rept.,
by R. J. Finkelstein, M. A. Melkanoff, S. A. Mosykowski, D. S. Saxon, and R. Norton. Mar 63, 39p.
Contract AF49 638 717, Proj. 9750, Task 27500
AFOSR 4702 Unclassified report

Descriptors: *Research program administration, Superconductors, Nuclear particles, Neutrinos, Deuterons, Deuteron reactions, Pions, Protons, Mesons, Momentum, Optics, Models, Beta decay, Scattering, Propagation, Nuclear physics.

AD-407 685 Div. 25
(TISTP/AM) OTS price $8.10

AiResearch Mfg. Co., Los Angeles, Calif.
RESEARCH ON THE APPLICATION OF BINARY GAS MIX-

TURES TO LOW TEMPERATURE COOLING SYSTEMS.
Final rept.,
by C. W. Browning. 20 May 63, 77p. Rept. no. SS881R
Contract AF33 657 8672, Proj. 4077, Task 407703
ASD TDR63 339 Unclassified report

Descriptors: *Coolants, *Gases, *Cryogenics, *Refrigerants, Neon, Nitrogen, Argon, Test methods, Feasibility studies, Phase studies, Test equipment, Experimental data, Dew point, Bubbles, Measurements, Reliability, Mixtures.

An investigation to determine the utility of several binary gas mixtures as cryogenic refrigerants is described. An experimental apparatus was designed and fabricated which permitted direct determinations of the phase boundaries of the selected cryogenic gas mixtures. Although no attempt was made in the experiments conducted under the study to obtain this type of data, this apparatus is also suitable for PVT data determinations. The apparatus is based on the dew point and bubble point method. The general principle of this method and the experimental apparatus and procedure for its operation are described in detail in this report. Experimental data were obtained for the binary systems of neon-argon and nitrogen-argon. These data consist of solid vapor, dew point, bubble point, and the three-phase boundaries at a fixed composition. Also, dew point curves were determined for three additional neon-argon mixtures. The possible application of the selected mixtures is discussed. In addition, the general problem areas and possible advantages of utilizing binary mixtures as cryogenic refrigerants are analyzed. (Author)

AD-407 687 Div. 25, 15
(TISTP/MH) OTS price $11.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE IDENTIFICATION OF OVERDAMPED PROCESSES IN THE TIME-DOMAIN,
by Jerry M. Mendel. 19 Apr 63, 142p. RR1131 63
Grant AFOSR62 280
Unclassified report

Descriptors: *Damping, Special functions, Errors, Numerical analysis, Stability, Analysis, Servomechanisms, High frequency, Polynomials, Matrix algebra, Time.

The problem of characterizing overdamped systems, from data in the time-domain, by means of exponential functions is studied. Particular attention is given to: (1) the choice of a suitable error criterion based upon performance measures the approximate system is to meet; (2) the choice of weighting functions and their effect on the approximations; and (3) the extension of the orthonormal exponential approximations of Kautz and Huggins to approximations of any asymptotic-order in the s-domain. The spirit of the research carried out is in keeping with the philosophy that the approximate system will replace the actual system in practical analyses. For example, the actual system may be embedded in the forward path of a positional servomechanism. In each of the areas of concentration, emphasis is placed on the effects that the asymptotic-order will have on the utility of the approximations in further analyses. (Author)

26. PRODUCTION AND MANAGEMENT

AD-406 844 Div. 26
(TISTB/DGH) OTS price $2.60

RAND Corp., Santa Monica, Calif.
RESOURCE ANALYSIS AND LONG-RANGE PLANNING,
by David Novick. June 63, 22p. RM3658PR
Contract AF49 638 700
Unclassified report

Descriptors: *Air force research, *Armed forces budgets, *Research program administration, Costs, Analysis, Effectiveness, Department of Defense, Air force, Management engineering, Budgets.

Program budgeting, cost effectiveness, and cost analysis are terms used with increasing frequency in our military establishment. This memorandum discusses each of the terms, with emphasis on cost analysis, and shows how the concepts that they represent are important for Air Force long-range planning. Since this memorandum is intended primarily for persons who must provide inputs to, as well as use the results of, cost analyses, examples are given of the kind of detailed information required. (Author)

AD-406 931 Div. 26
(TISTE/CAM) OTS price $.50

Frankford Arsenal, Philadelphia, Pa.
MECHANICAL PROPERTIES OF WELDED ALUMINUM-MAGNESIUM ALLOY PLATES,
by D. Carosiello. Jan 63, 15p.
Proj. DA1H0 24401A110 04
FA M63 25 1 Unclassified report

Descriptors: *Aluminum alloys, *Magnesium alloys, *Metal plates, Tensile properties, Mechanical properties, Silicon alloys, Radiography, Welding.

The transverse tensile properties of welds in aluminum-magnesium alloy plates of 5083-H115 and 5456-H321 were obtained for 1-1/4 in. thick plate. The filler metals tested were the aluminum-magnesium alloys 5183, 5556, and 5456, and the aluminum-silicon alloy 4043. The test assemblies were welded by the semi-automatic gas metal-arc (MIG) welding process. The tensile specimens were tested with the weld reinforcement removed. The highest mechanical properties for each base metal alloy were obtained using either 5183 or 5556 filler metal. The base metal/filler metal combination 5456/5556 produced the highest tensile strength of all combinations tested. The highest joint efficiency, however, was obtained with weldments 5083/5183 and 5083/5556. Although yield strengths differed only slightly, the highest values were obtained with 5456/5183 and 5456/5556. Combination 5083/5556 provided the greatest elongation within a three-inch gage length. (Author)

AD-406 957 Div. 26, 15
(TISTP/WH) OTS price $3.60

RAND Corp., Santa Monica, Calif.
A TEST OF A STATISTICAL METHOD FOR COMPUTING SELECTED INVENTORY MODEL CHARACTERISTICS BY SIMULATION,
by Murray A. Geisler. May 63, 24p. RM3623PR
Contract AF49 638 700
Unclassified report

Descriptors: *Logistics, *Statistical analysis, Management engineering, Numerical analysis, Numerical methods and procedures, Digital computers, Mathematical models, Analysis of variance, Inequalities, Monte Carlo methods, Simulation.

The design and operation of simulation models for studying management policies and other problems that involve complex systems of random variables are being studied. The present text is a companion piece to M. A. Geisler, 'The Sizes of Simulation Samples Required to Compute Certain Inventory Characteristics with Stated Precision and Confidence', The RAND Corporation, RM-3242-PR, October, 1962. Special statistical methods were used in that study to compute the sample sizes for specified inventory models. In this study, the methods are tested by applying them to particular inventory cases, and determining how well the actual precision and confidence obtained in the estimates agreed with expectation. (Author)

AD-407 040 Div. 26, 15
(TISTP/AW) OTS price $4.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
PRODUCTION PLANNING WITH CONVEX COSTS: A PARAMETRIC STUDY,
by Arthur F. Veinott, Jr. 22 May 63, 36p. TR66
Contract Nonr22553, Proj. NR042 002
Unclassified report

Descriptors: *Industrial production, *Costs, Linear programming, Functions, Scheduling, Logistics, Storage, Mathematical models, Operations research.

This study is concerned with the problem of choosing the amounts x sub 1, x sub 2,..., x sub n of a single product (or aggregation of several products) to produce in each of n successive time periods 1,2,...,n so as to minimize the total manufacturing costs over the n periods. The requirements r sub 1, r sub 2,..., r sub n for the product occurring in periods 1,2,...,n are assumed to be known in advance. Requirements in a period are satisfied in so far as possible from stock on hand at the beginning of the period and from production during the period. Requirements which cannot be met in this was are backlogged until they can be satisfied by subsequent production. (Author)

AD-407 278 Div. 26, 27, 25
(TISTP/AW) OTS price $1.60

Arde-Portland, Inc., Paramus, N. J.
FABRICATION OF A 65.5-INCH-DIAMETER SIMULATED ROCKET MOTOR CASE BY CRYOGENIC STRETCH-FORMING.
Technical progress rept. no. 3, 13 Feb-13 May 63,
by George Claffy. 13 May 63, 10p.
Contract AF33 657 9638
Unclassified report

Descriptors: *Rocket cases, *Stretch forming, Cryogenics, Arc welds, Stainless steel, Tensile properties, Models (Simulations), Manufacturing methods.

The program objectives are to demonstrate the applicability of the cryogenic stretch-forming process to the fabrication of large rocket motor cases of heavy wall thickness. Previous work has shown the feasibility of fabricating high-strength rocket cases by cryogenic stretch-forming. Effort under the present contract is directed at 'scaling up' the equipment and techniques to handle the size and wall thickness of a big-boost motor. (Author)

AD-407 313 Div. 26, 17
(TISTM/AMS) OTS price $14.00

Alloyd Corp., Cambridge, Mass.
A STUDY OF ELECTRON BEAM WELDING.
Final summary rept.,
by S. S. White. Nov 62, 1v.
Contract DA19 020ORD5484, Proj. 5B93 32 004
WAL 401 54 2 5 Unclassified report

Descriptors: *Welding, *Titanium alloys, *Steels, *Molybdenum alloys, Stainless steel, Heat, Gases, Welds, Aluminum alloys, Tin alloys, Vanadium alloys, Chromium alloys, Hydrogen, Tensile properties, Grain structures (Metallurgy), Ductility, Heat treatment, Tool steel, Low-pressure research, Stresses, Toughness, Heating, Manufacturing methods, Elasticity, Aging (Materials), Oxygen, Nitrogen, Fracture (Mechanics), Temperature, Electron beams.

The electron beam welding gun has been successfully used to effect a non-melting, postheat treating pass embracing only fusion and high temperature heat-affected zones. The technique has been applied to the five DOD titanium sheet rolling alloys, several types of high strength steel, molybdenum and molybdenum - 1/2 titanium alloy, all in 1/8 in. thickness. Depending on the material and its condition of heat treatment, a postheat treatment can be designed to match fusion zone and base metal in terms of strength, strain, modulus and impact resistance. For some materials, as-welded properties could be increased in value to above those of the unwelded condition. (Author)

AD-407 372 Div. 26, 17
(TISTM/AMS) OTS price $10.50

General Electric Co., Cincinnati, Ohio.
ELECTROLYTIC MACHINING DEVELOPMENT.
Interim technical engineering rept., 4 Sep 62-3 June 63,
by Joseph Bayer. June 63, 1v.
Contract AF33 657 8794, ASD Proj. 7 648b(I)
ASD TR7 648bIR1 Unclassified report

Descriptors: *Electroerosive machining, *Meterial removal, Theory, Experimental data, Electric currents, Anodes, Mathematical analysis, Electrolytes, Manufacturing methods, Sodium compounds, Chlorides, Alloys, Temperature, Viscosity, Design, Tool steel, Nickel alloys, Metals.

The variables affecting electrolytic machining are theoretically derived, and subsequently demonstrated by experiment. Hypothetical concepts of the inter-relationships among variables are expressed mathematically. Significant operating and process variables for two alloy-electrolyte systems were determined for their effects on metal removal rate and required imposed voltage. Metal removal rate proved to be affected almost entirely by current density. The concept of equilibrium gap is explained. When equilibrium gap is established, feed rate varies directly with current density. Selected electrode materials were evaluated. Required imposed voltage was affected by current density, chemical composition, temperature, and flow characteristics of the electrolyte during machining. Of these, flow characteristics have proved the most difficult to control. Within a moderate range, sludge content does not affect conductivity nor specific gravity. The viscosity of the electrolyte is sensitive to sludge content. (Author)

AD-407 428 Div. 26, 18, 30
(TISTP/AW) OTS price $6.60

IBM Federal Systems Div., Rockville, Md.
EVALUATION OF NAVY INVENTORY DECISION RULES UTILIZING THE IBM INVENTORY MANAGEMENT SIMULATOR.
Final rept.
29 June 62, 59p.
Contract Nonr3742 00
Unclassified report

Descriptors: *Management engineering, *Logistics, Programming (Computers), Navy, Simulation.

The IMS is a computer program consisting basically of a series of routines logically associated with such inventory factors as review period, order point, order quantity, lead time, safety stock level, and forecasting. By properly combining, and sometimes modifying these routines, virtually any inventory control system may be simulated. The major functions of the IMS are summarized as follows: (1) Demands may be either supplied from historical records or synthesized by a demand generator; (2) Forecasting may be done by exponential smoothing or moving average with the option of trend and seasonal corrections; (3) Order point and order quantity calculations may be done either after each transaction or on a periodic basis; (4) Material flow is controlled primarily through use of the on-hand and on-order amount. When material is ordered, the amount is placed in a queue. At the conclusion of the appropriate lead time, this amount is removed from the queue and added to the on-hand quantity; and (5) Policy evaluation is done on an item basis and for a group of items. At the end of each simulation run, a printout is generated showing level of inventory, costs, and service provided. (Author)

27. PROPULSION SYSTEMS

AD-406 842 Div. 27, 30
(TISTA/REB) OTS price $4.60

Naval Ordnance Test Station, China Lake, Calif.
DESIGN CRITERIA FOR LARGE ACCURATE SOLID-PROPELLANT STATIC-THRUST STANDS,
by D. P. Ankeney and C. E. Woods. June 63, 48p.
NAVWEPS 8353; NOTS TP3240
Unclassified report

Supersedes IDP 1551.

Descriptors: *Solid rocket propellants, *Captive tests, Rocket motors (Solid propellant), Test facilities, Thrust, Design.

Design criteria are presented for the construction of a large solid-propellant static-thrust stand to meet specific requirements of accuracy, flexibility, adaptability, ease of assembly and operation, safety, and low cost. Design concepts of dynamic stand evaluation, calibration accuracy and error analysis, continuous-mass measurement, inplace calibration, alignment, damage control, and environmental testing are discussed. Also included is a suggested design procedure formulated to provide guidance in the design and development of a static-test stand that will attain the unique goals of a particular facility. (Author)

AD-406 944 Div. 27, 22
(TISTA/LSK) OTS price $4.20

Army Tank-Automotive Command, Detroit, Mich.
COOLING AND PERFORMANCE CHARACTERISTICS OF THE XM-551 ARMORED RECONNAISSANCE AIRBORN ASSAULT VEHICLE.
Final rept.,
by Arthur L. Jaeger, Jr. 17 Apr 63, 1v.
ATAC Rept. no. 7746 Unclassified report

Descriptors: *Armored vehicles, *Internal combustion engines, Self-propelled guns, Automatic transmissions, Tests, Liquid cooled.

An investigation was conducted to determine the performance and cooling characteristics of the XM-551 vehicle at 115 F. High ambient performance and cooling tests were conducted at full-rack, 3rd driving range with a 3-5 mph headwind. Maximum observed sprocket horsepower was 182 at 2797 rpm engine speed with transmission in 3rd driving range lockup. The vehicle at full-fuel rack cooled at 115 F with the transmission in third driving range at all design operating speeds. The coolant thermostat was blocked open and the fan automatic speed control removed. The highest lockup temperatures were obtained at an engine speed of 2798 rpm. Engine sump oil, coolant leaving the engine, and oil leaving the transmission were 254, 197 and 235 F at 115 F ambient. The highest converter temperatures were observed at the lowest converter ratio. At a converter speed ratio of 0.56, engine sump oil, coolant leaving the engine, and oil leaving the transmission were 255, 207 and 262 F at 116 F ambient.

AD-407 078 Div. 27, 12, 17
(TISTA/LSK) OTS price $1.10

Arde-Portland, Inc., Paramus, N. J.
FABRICATION OF PROTOTYPE ROCKET MOTOR CASE BY CRYOGENIC STRETCH-FORMING.
Quarterly rept. no. 4, 1 Mar-31 May 63,
by J. Cioffi. 31 May 63, 5p.
Contract NOw620730
Unclassified report

Descriptors: *Rocket cases, Guided missiles (Air to air), Weight, Stresses, Hydrostatic pressure, Cryogenics, Quality control, Manufacturing methods, Rocket closure cups, Stretch forming.

Progress is reported on an experimental flight-weight rocket motor cases of the Sparrow configuration by the cryogenic stretch-forming process. Achievement of B/P dimensions and determination of the suitability of the cryogenic stretch-forming process for production are the specific aims of the program. Techniques are being developed to achieve B/P dimensions in several areas of the Sparrow Motor Case. These areas included dimensional deviations in the contour of the hemispherical segment of the aft closure and the diameter of the forward thickened ring. Both of these problems have been solved during this report period. Fabrication of the nozzle end ring presented a problem because of material springback during the mechanical stretch by a punch. During this report period, the feasibility of this method of fabrication of heavy rings was demonstrated, although one dimension was not achieved. (Author)

AD-407 299 Div. 27, 12
(TISTA/GEC) OTS price $5.60

Hercules Powder Co., Bacchus, Utah.
MOTOR STORAGE STUDIES PROGRAM PLAN PHASE I, MOTOR STORAGE PROGRAM. VOLUME I. WEAPON SYSTEM 133A.
17 June 63, 1v. MTO258 3
Contracts AF04 647 243 and AF04 694 127
Unclassified report

Descriptors: *Rocket motors (Solid propellant), *Third stage motors, Guided missiles (Surface to surface), Scheduling, Research program administration, Transportation, Handling, Storage, Environmental tests.

The Motor Storage Program uses a total of 15 Wing I, 6 Wing II, and 4 Wing IV stage III Minuteman rocket motors. A master schedule, giving casting, storing, and firing dates and other details, shows that the different motors will undergo storage periods varying from 1 to 10 yr. Storage will be in conditions simulating operational environment. The program is composed of 11 steps that include, along with storage, transportation conditioning, test firing, inspections at various times, and, finally, analysis and evaluation. The program is designed to evaluate the storage capability of the stage III Minuteman motor under operational conditions, and ultimately to aid in the prediction of the usable life of the operationally deployed motor. (Author)

AD-407 303 Div. 27, 9, 13
(TISTE/OHD) OTS price $6.60

Quartermaster Research and Engineering Command, Natick, Mass.
FURTHER STUDIES OF THE JET COMPRESSOR,
by Harold J. Hoge and Ronald A. Segars. May 63, 61p.
QREC TR PR9 Unclassified report

Descriptors: *Jets, *Compressors, *Fluid flow, *Gas flow, Jet pumps, Jet mixing flow, Separation, Supersonic flow, Compressible flow, Fluid dynamic properties, Theory.

A description is given of the various regimes of flow that can exist in the jet compressor. A new apparatus is described and data taken with it on 6 systems of gases (He:Freon-113, He:air, air:Freon-113, air:Freon-12, air:air, and Freon-12:air) are presented. The highest efficiency achieved with the new apparatus is 0.125, at a compression ratio of 1.590, with helium as the driven gas and Freon-113 as the driving gas. Calculations of momentum-flux balance within the jet compressor are made, with allowances for friction, and, when necessary, for flow separation within the driving-gas nozzle. The changes of available energy associated with the various processes that take place within the jet compressor are individually calculated from the experimental data. The flow rate of driven fluid is calculated as a function of inlet pressure for the system air:Freon-113, by a method proposed by Fabri and Siestrunck; the results represent the observations, but not accurately. (Author)

AD-407 315 Div. 27, 12
(TISTA/GEC) OTS price $7.60

Rocketdyne, Canoga Park, Calif.
EFFECT OF HEAT ENVIRONMENT AND LENGTH OF ULLAGE FITTING ON OPERATING DURATION OF THE ATLAS MA-2/5 VERNIER ENGINE.
30 Apr 63, 73p. R5123
Contract AF04 694 135
Unclassified report

Descriptors: *Vernier rocket motors, *Fuel systems, Control systems, Pneumatic systems, Thermal radiation, Design, Liquid rocket oxidizers.

The results of an analytical study to determine the effect of heat input to the Atlas MA-2/5 oxidizer start tank on vernier engine duration are presented. Also presented are the results of a test program to determine the saving affected in residual oxidizer weight through the use of a special oxidizer start tank ullage fitting with increased length. (Author)

AD-407 325 Div. 27, 30
(TISTA/GEC) OTS price $7.60

Naval Ordnance Test Station, China Lake, Calif.
DESCRIPTION OF A CONTROL SYSTEM FOR ROCKET-MOTOR MASS MEASUREMENT,
by R. A. Elston. June 63, 70p.
NAVWEPS 8354; NOTS TP3241 Unclassified report

Descriptors: *Rocket motors (Solid propellant), Combustion, Captive tests, Test equipment, Theory, Analysis, Measurement, Design, Control systems, Mounting brackets, Springs, Resonance, Weight.

A technique for determining the mass of large rocket motors during burning, and an experimental system developed for use with the NOTS-designed three-component static-test stand at the Skytop facility, are described. The technique involves mounting the rocket motor on springs and continuously exciting the spring-mass system at its natural frequency. The theoretical design of the control system is discussed and theoretical system-performance characteristics are compared with those of the experimental system. Results of an analog simulation study conducted in two degrees of freedom are included in the appendix. Analysis of data from an evaluation test involving the static firing of a large rocket motor, indicates that a 2% accuracy in mass measurement is attainable with the experimental system. Criteria for the design of an operational system that will produce an accuracy of 1% are presented. (Author)

AD-407 551 Div. 27
(TISTM/AM) OTS price $3.60

Virginia U., Charlottesville.
COMPRESSIBLE FLOW OF AN AIR-WATER MIXTURE THROUGH A VERTICAL, TWO-DIMENSIONAL, CONVERGING-DIVERGING NOZZLE,
by J. F. Muir and R. Eichhorn. Apr 63, 32p.
PR105P
Contract Nonr362300, Proj. NR098 038
Unclassified report

In cooperation with Princeton U., N. J.

Descriptors: *Compressible flow, *Nozzles, Equations, Combustion, Detonations, Shock waves, Theory, Fluid flow, Gas flow, High-speed photography, Pressures, Air, Water.

The physical system reported on in this paper is that of the flow of a gas-liquid mixture (specifically air-bubbles dispersed in water) through a convergent-divergent nozzle under an overall pressure ratio sufficient to choke the flow at the nozzle throat. In all the results reported herein, the throat pressure was held at about one atmosphere. The parameters varied were the air-water mass ratio (to achieve values of the throat volume flow fraction ranging approximately from 0.1 to 0.8), the upstream pressure and the overall pressure ratio. Pressure measurements were taken in the mixing section and at three locations in the nozzle: upstream of the convergent section, at the throat, and in the divergent section near the nozzle exit. The mass flow rates and temperatures of the air and water were measured ahead of the mixing section. A Fastax camera was used to take high speed motion pictures (5000 frames per sec.) of the flow in the

vicinity of the nozzle throat. The experimental pressure ratios and velocities are presented as functions of mass and volume ratios and compared with values predicted by existing homogeneous mixture theory. (Author)

AD-407 558 Div. 27, 12
(TISTA/LSK) OTS price $12.00

Beech Aircraft Corp., Boulder, Colo.
ESTABLISHING TANK DESIGN CRITERIA FOR LIQUID HYDROGEN ROCKETS. VOLUME IV - FLIGHT SIMULATION TEST PROGRAM.
Final rept. for period ending 31 Jan 62,
by H. L. Breckenridge and D. C. VanGundy.
June 63, 147p. Rept. no. 8768
Contract AF33 616 5154, Proj. 3084, Task 30304
AFFTC TR60 43, vol. 4 Unclassified report

Descriptors: *Fuel tanks, Titanium alloys, Stainless steel, Thermal stresses, Propellant tanks, Thermal insulation, Space environmental conditions, Liquefied gases, Test methods, Manufacturing methods, Space flight, Simulation, Liquid rocket fuels, Design, Hydrogen.

A flight simulation test program was continued for liquid hydrogen boost tanks. Preliminary design criteria for the tank system of a series of chemical and nuclear rocket vehicles was evolved. It was determined during that program that further research and development work was needed in certain areas in order to firmly establish the desired tank design criteria. The thermal performance of a hydrogen fuel tank during powered flight was determined to be an important tank design parameter and that the relationship between thermal performance and tank design is quite complex. This flight simulation test program is directed toward the solution of the basic heat transfer problem. A 7,000-gallon liquid hydrogen tank was fabricated from both stainless steel and titanium. This volume considers the fabrication and testing of these tanks. (Author)

AD-407 596 Div. 27, 15
(TISTP/FEM) OTS price $2.60

Aeronautical Research Associates of Princeton, N. J.
THE SUPERSECULARITIES IN WEAK COUPLING KINETIC THEORY,
by Guido Sandri. June 63, 20p. Technical rept. ARAP6R
Proj. NR098 038
Unclassified report

In cooperation with Virginia U., Charlottesville, Contract Nonr362300. Report on Proj. Squid.

Descriptors: *Kinetic theory, *Distribution theory, *Propulsion, Particles, Functional analysis, Partial differential equations, Operators (Mathematics), Gases, Diffusion, Functions, Mathematical analysis.

It has been shown that the higher order kinetic equations are divergent in an irreparable fashion. The singularities are determined completely in the nth order s-body distribution function for the weak-coupling kinetic theory (supersecularities). (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-407 056 Div. 28, 30, 1
(TISTM/ODN) OTS price $9.10

Douglas Aircraft Co., Inc., Santa Monica, Calif.
ARMY-NAVY INSTRUMENTATION PROGRAM. FIXED WING RESEARCH PHASE.
Technical summary.
1 May 63, 96p. Rept. no. 44241
Contract Nonr107600
Unclassified report

Supplement to ANIP Historical Report No. 40641A.

Descriptors: *Reports, *Instrumentation, Data processing systems, Simulation, Materials, Display systems, Operators (Personnel), Pilots, Aviation personnel, Computers, Bibliographies, Detectors.

AD-407 084 Div. 28
(TISTB/DGH) OTS price $1.10

Vanderbilt U., Nashville, Tenn.
THE PICTURE DESCRIPTION TEST: A PRELIMINARY REPORT,
by Carroll E. Izard, Don H. Randall, and Eugene S. Cherry. Apr 63, 6p. TR16
Contract Nonr214903
Unclassified report

Descriptors: *Reaction (Psychology), *Photographs, *Personality, Stimulation, Head, Photographic analysis, Psychometrics, Emotions, Verbal behavior, Projective techniques, Perception.

In the development of a technique for measuring deviations in the perceptual-affective response to pictures of people (Picture Description Test) (PDT) a wide variety of pictures of people expressing varying degrees of positive and negative affect were presented to a large number of subjects or judges with the request that they supply verbal descriptions of the pictures. These free responses obtained in written or oral form were studied for common denominators. In this way three, four, or five terms were derived which would be very frequently chosen as descriptive of a given picture and an equal number that would be very infrequently considered as descriptive. A parallel step was to present a large number of pictures to Ss and with each picture a set of eight or ten words selected by a few judges. Ss were asked to pick the most descriptive word, the second most descriptive, the third most descriptive, and then to pick the word that was not descriptive at all. From these two sources of data a set of six words were derived for each of 56 pictures, three of which seemed to be rather highly descriptive of the picture and three of which seemed to be characteristically non-descriptive. (Author)

AD-407 139 Div. 28
(TISTB/MS) OTS price $1.10

Harvard U. Medical School, Boston, Mass.
SOME FACTORS AFFECTING DISAGREEMENT IN A SMALL GROUP,
by David Shapiro and Mona E. Morningstar. Jan 63, 9p. TR6
Contract Nonr186643, Proj. NR170 518
Unclassified report

Descriptors: *Group dynamics, *Decision making, Behavior, Social communications.

A study was made of the degree to which groups of 3 persons disagree in achieving decisions in a simple task as a function of several experimental and subject variables. It may be concluded that disagreement as a process of interaction in achieving a decision is more closely related to the individuals in a group and to their characteristic ways of approaching a task than to the characteristics of the task itself, at least in the laboratory situation used. In studying how

people interact in achieving decisions, we need be less concerned with the objective characteristics of the task and more with the ways people approach and interact in finding solutions to problems. (Author)

AD-407 140 Div. 28, 16
(TISTB/DGH) OTS price $2.60

Harvard U. Medical School, Boston, Mass.
SOCIAL ISOLATION AND SOCIAL INTERACTION. A BEHAVIORAL AND PHYSIOLOGICAL COMPARISON,
by David Shapiro, P. Herbert Leiderman, and Mona E. Morningstar. Jan 63, 28p. TR5
Contract Nonr186643, Proj. NR170 518
Unclassified report

Descriptors: *Sociology, *Behavior, *Social communication, Galvanic skin response, Confined environments, Culture, Motivation, Stimulation, Reaction (Psychology), Motor reactions, Reflexes, Decision making, Group dynamics, Sensory deprivation.

Eighty-four women performed a simple task under conditions of social isolation and social interaction in a 3-person group. Success and failure in the task were made equivalent in both conditions, and the order of the experience was balanced. Mean level and variability of behavioral initiation, galvanic skin potential, and heart rate were compared. The experiment demonstrates that the social setting can modify physiological response and performance of individuals. Some measures are sensitive to the social conditions and the order in which they occur, while others appear to reflect relatively stable characteristics of the individual. The findings in this study have implications for future research on the socialization of behavioral and physiological processes. (Author)

AD-407 175 Div. 28
(TISTB/MS) OTS price $3.60

Research Center for Group Dynamics, U. of Michigan, Ann Arbor.
THE EFFECT OF APPARENT PERFORMANCE AND GROUP SUCCESS ON CHANGES IN STATUS WITHIN A GROUP STRUCTURE,
by Eugene Burnstein, Robert B. Zajonc, and James J. Taylor. Mar 63, 35p. TR22
Contract Nonr122434, Proj. NR170 309
Unclassified report

Descriptors: *Group dynamics, Performance tests, Effectiveness.

This study examined efforts by members under continuous or under intermittent group success to induce a status change which would maximize the value of group performances. Cooperative four-man status hierarchies performed a group reaction time task. Members were to react quickly enough to prevent the appearance of a failure signal. The latter was controlled by E, appearing according to a fixed schedule. Group success occurred when at least two members beat the signal (the group was eligible to receive points toward a prize). The extent of success (number of points received) depended on the status of the successful individuals, high status members contributing more to the group total than low status members. Following each block members voted privately on desired status reassignments. Voting indicated that efforts at status reassignment which restore the fit between apparent and appropriate success occurred more rapidly and more frequently under continuous than under intermittent group success. Such efforts were curvilinearly related to status with occupants of extreme statuses making earlier and more frequent efforts than occupants of intermediate statuses. (Author)

AD-407 176 Div. 28, 32
(TISTB/DGH) OTS price $3.60

Research Center for Group Dynamics, U. of Michigan, Ann Arbor.
THE EFFECTS OF STATUS ON GROUP AND INDIVIDUAL PERFORMANCE,
by Eugene Burnstein, Robert B. Zajonc, and James J. Taylor. Mar 63, 38p. TR23
Contract Nonr122434, Proj. NR170 309
Unclassified report

Descriptors: *Group dynamics, *Motivation, *Performance tests, Reflexes, Stimulation, Analysis of variance, Visual signals, Display systems, Reaction (Psychology).

Reaction time performance was examined in a group setting. Members were to react quickly enough to prevent a failure signal from appearing. The latter was controlled by E, appearing according to a fixed schedule. The extent of success depended on the status of the successful members, high status members being able to contribute more points to the total than low status members. Status distinctions were introduced following practice. After each experimental block members privately voted on desired status changes. On the first four experimental blocks, individual success was scheduled to produce an optimum fit between an occupant's performance and that deemed appropriate to his status. After block four discrepancies were induced between apparent and appropriate performance. (1) Introduction of status distinctions produced a general decrease in RT. (2) Later performance changes depended on the direction and extent of the discrepancy between appropriate and apparent success. RT decreased when success became less frequent than that appropriate for the status. RT increased when success became more frequent than appropriate. (3) When a persistent discrepancy led the group to change a member's status, performance changes followed: an increase in status reduced RT; a reduction in status increased RT. (Author)

AD-407 377 Div. 28
(TISTB/DGH) OTS price $2.60

Vanderbilt U., Nashville, Tenn.
THE EFFECT OF NATURAL AND INDUCED AFFECT ON AUTONOMIC AND INTELLECTUAL FUNCTIONING,
by J. Robert Mack and Carroll E. Izard. Apr 63, 30p. Technical rept. no. 15
Contract Nonr2149 03
Unclassified report

Descriptors: *Behavior, *Attitudes, Emotions, Anxiety, Galvanic skin response, Autonomic nervous system, Reasoning, Sociometrics, Analysis of variance, Stimulation, Motor reactions.

Investigations were made of the simultaneous effects of natural and induced affect upon autonomic and intellectual functioning. Heart rate, skin temperature, and rate of sweat were selected as the measures of autonomic activity. Problems of ingenuity, multiple uses, digit span reversed, and letter association were the tests used to measure intellectual productivity. (Author)

AD-407 405 Div. 28
(TISTP/AW) OTS price $4.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
A TECHNIQUE OF INVESTIGATING TANK GUNNER

TRACKING ERROR,
by Francis M. McIntyre, John D. Waugh and David A. Polefka. Sep 62, 41p.
HEL TM20 62 Unclassified report

Descriptors: *Tracking, *Human engineering, *Gunnery trainers, Errors, Gunnery, Instrumentation, Motion, Design, Tanks (Combat vehicles).

This study is a report of the ability of tank gunners to track continuously over a period of time, to evaluate the role of experience in reducing error, and to provide a basic measurement technique for future tracking studies. Experienced and novice gunners served as subjects, tracking a target tank through evasive maneuvers around a rectangular course, at various ranges. The results of the study indicate that the instrumentation and procedure designed for this study provide a satisfactory technique of measuring tracking error, that the subject's experience did not affect tracking performance in this problem, and that the measuring technique may be used to evaluate target evasive techniques as well as tracking error. (Author)

AD-407 406 Div. 28
(TISTB/DGH) OTS price $1.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
A METHOD FOR INCREASING EFFICIENCY OF DIAL CHECK-READING,
by Sidney G. Dashevsky and Sam Glucksberg.
Mar 63, 7p.
HEL TM6 63
Unclassified report

Descriptors: *Display systems, *Clocks, *Instrument dials, Effectiveness, Performance tests, Errors, Human engineering, Reading.

The conventional check-reading display, using dials in rows and columns with pointers aligned at the 12 o'clock position, was compared to a similar display with pointers connected by straight lines, i.e., with the pointers in normal position they are seen as segments of straight lines. In this latter display, called the extended-line display, the subjects' task was merely to detect a break in a line, rather than to detect a deviant pointer. Detection of deviant dials was consistently superior with the extended-line display; the displays did not differ with respect to the observers' ability to localize deviant dials in the display array. (Author)

AD-407 440 Div. 28, 1
(TISTB/DGH) OTS price $10.10

Courtney and Co., Philadelphia, Pa.
THE PILOT'S VISUAL TASK. A STUDY OF VISUAL DISPLAY REQUIREMENTS,
by Mark G. Pfeiffer, W. Crawford Clark, and James W. Danaher. Mar 63, 117p.
Contract N61339 783
NTDC NAVTRADEVCEN 783 1 Unclassified report

Descriptors: *Training, *Training devices, *Flight simulators, Visual signals, Vision, Display systems, Pilots, Visual acuity.

An analysis was made of the perceptual characteristics of the pilot's visual world while performing various flight tasks. These were compared with the perceptual characteristics made available by typical nonprogrammed visual displays attached to flight trainers. An experiment was then conducted in the F-100 simulator equipped with the 151 visual attachment to determine training effects. It was determined that, even among experienced subjects, performance significantly improved, both with regard to (1) the detection of inflight emergencies and (2) the maintenance of aerodynamic stability. Recommendations are made for improvements in external visual displays to enhance the training value of flight simulators. (Author)

AD-407 496 Div. 28, 5
(TISTB/AAR) OTS price $5.60

Texas Instruments Inc., Dallas.
SPEAKER RECOGNITION.
Final rept.,
by Gary L. Holmgren. May 63, 42p.
Contract AF19 628 345, Proj. 4610, Task 461002
AFCRL 63 119 Unclassified report

Descriptors: *Voice communication system, Speech, Samples, Recording systems, Measurement.

This research is concerned with defining a perceptual space within which listeners locate voices, to the end that the effects of manipulating speaker, hardware, and listener characteristics can be measured, and eventually, that specifications for elements of the communication system can be prepared to produce the desired system characteristics. In the experiments taped speech samples were rated by listeners using Osgood's semantic differential method. Previous study indicated only four basis dimensions were required to account for ratings given speakers on a large number of characteristics. In a second experiment, a reduced number of characteristics, selected from the original list as best representing the four necessary factors, was used by listeners to rate speakers from AFCRL's speaker library. The experimental design allowed examination of the effects on ratings due to differences between listeners, due to repetition of the rating task, and to order of speaker presentation. Results of these examinations and the following are presented: The adequacy of original factors to account for listeners' ratings; The differentiation between speakers; The reliability of ratings; The familiarity of previously unheard voices. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-407 013 Div. 29, 16, 28
(TISTM/ODN) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
A NEW HEAVY WINTER FLYING CLOTHING ASSEMBLY,
by James H. Veghte and James I. Clogston. Sep 61, 9p.
AAL TN61 4 Unclassified report

Descriptors: *Flight clothing, Physiology, Acceptability, Cold weather tests, Polar regions, Skin, Body temperature, Arctic tests, Tests.

A serious clothing problem is imposed on aircrew personnel because of space limitations in the cockpits of many jet aircraft. It is often difficult or impossible for flight crews to wear adequate clothing for protection in extremely cold environments that may be encountered during an emergency survival situation. The possibility of replacing certain garments of the standard AF winter flying assembly with newer and better insulated garments within the Air Force inventory was investigated as one approach to this problem.

Such an assembly was devised and compared with the standard assembly by measuring various physiological responses of subjects in cold environments. (Author)

AD-407 452 Div. 29, 14
(TISTM/ODN) OTS price $2.60

Naval Propellant Plant, Indian Head, Md.
SOME CONSIDERATIONS ON PLASTIC MATERIALS FOR USE AS SAFETY CONTAINERS,
by Martin F. Zimmer and Leo K. Asaoka. 15 Apr 63, 21p.
NavWeps rept. 8030 NPP Technical Rept. 130
Unclassified report

Descriptors: *Isocyanate plastics, *Containers, *Polyethylene plastics, *Plastics, Safety devices, Nitroglycerin, Detonations, Tensile properties, Tests, Aluminum, Styrene plastics, Nylon, Acrylic resins, Halocarbon plastics, Explosions, Explosion effects, Configuration, Explosive materials, Shock (Mechanics), Attenuation.

Developmental studies were made with polyurethane containers. The effects of material properties, shape and size of both inneer vials and containers, and the shock attenuation of the container material were investigated. Various materials were evaluated as possible candidates for fabricating the containers. Polyethylene containers, to safely hold comparatively large loads of explosive materials, were developed and investigated. A 10-cm-dia. container can easily withstand the explosion of 15 g of nitroglycerin, and a 32-cm-dia. container can withstand an explosion of 500 g of nitroglycerin. The smaller container weighs 0.775 kg and can easily be handled by one hand; the larger container weighs less than 22 kg and is easily made portable with carrying handles or by transporting in cart. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-406 874 Div. 30
(TISTP/FR) OTS price $10.10

Sylvania Electronic Systems, Needham, Mass.
MOBILE A MOBIDIC COBOL COMPILER.
Quarterly progress rept. no. 2, 1 May-1 Oct 62. 1 Oct 62, 1v. Rept. no. Q63 4N
Contract DA36 039sc89231
Unclassified report

Descriptors: *Programming (Computers), Programming languages, Digital computers, Army operations.

The program during this reporting period included unit testing and the beginning of package testing for the MOBIDIC MOBILE Runs. Runs 1.0, 1.1, 2, 4, 5 and the Non I/O Generators are ready to begin or have begun package testing. The segmentation of Run 1.3 and the I/O Generator is complete. New coding is complete for the sort-merge routines. The following areas are discussed: (1) modification of runs, (2) MOBILE I systems tape, and (3) tape allocation and usage. (Author)

AD-406 889 Div. 30, 16
(TISTM/ODN) OTS price $1.25

Biotechnology Lab., U. of Calif., Los Angeles.
FEASIBILITY STUDY OF A SMALL THERMAL CHAMBER FOR PROGRAMMED TRANSIENT INCREASES AND DECREASES IN TEMPERATURE.
Final rept.,
by Jeremy Crocker and John Lyman. Mar 63, 36p. 63 1
Contract AF33 616 6763, Proj. 7222, Task 722204
AMRL TDR63 15 Unclassified report

Report on Biophysics of Flight.

Descriptors: *Heat tolerance, *Temperature control, *Space medicine, Heating, Heat, Feasibility studies, Heat transfer, Fluids, Silicone plastics, Temperature, Costs, Thermodynamics, Test facilities, Test equipment.

Performance specifications of a rate of change of 200 F per minute and a maximum temperature of 600 F were arbitrarily set for a possible thermal chamber facility. Various methods of heating were examined and the decision was made to make a special study of a fluid wall thermal chamber as a promising approach to achieve the desired specifications. It was found that it should be possible to construct a circulating fluid wall chamber, using commercially available silicone derivative fluids for under $40 per square foot of area, plus a fixed cost for controlling equipment. Based on approximate figures, it was concluded that an 8-foot chamber, meeting the desired specifications and with a capability for extending its operation into a thermal range below room temperature, could be constructed for under $50,000. (Author)

AD-406 919 Div. 30, 2
(TISTP/GRW) OTS price $5.60

Northwestern U., Evanston, Ill.
A SURFACE-FITTING PROGRAM SUITABLE FOR TESTING GEOLOGICAL MODELS WHICH INVOLVE AREALLY-DISTRIBUTED DATA,
by E. H. Timothy Whitten. 1963, 56p. TR2
Contract Nonr122826, Task 389 135
Unclassified report

Descriptors: *Geology, *Data processing systems, Polynomials, Matrix algebra, Partial differential equations, Punched cards, Model tests, Programming (Computers).

A surface-fitting program is given which is suitable for testing geological models which involve areally-distributed data. The Fortran listing and program flow charts are given in full. The method of utilizing the surface-fitting program is described in detail with the aid of an actual example. (Author)

AD-406 930 Div. 30, 9
(TISTP/MFA) OTS price $2.60

Watkins-Johnson Co., Palo Alto, Calif.
RESEARCH ON GASEOUS OPTICAL MASER TO DEVELOP HIGH CONTINUOUS WAVE POWER AT OPTICAL WAVELENGTHS.
Interim engineering rept. no. 2, 1 Aug-31 Oct 62,
by S. E. Sobottka. 31 Oct 62, 17p. W J62 606R8
Contract AF33 657 8986
Unclassified report

Descriptors: *Lasers, Gases, Helium, Neon, Discharge tubes, Electron beams, Diffraction, Optical equipment, Mirrors, Ionization, Design.

He-Ne gas lasers at both 1.15 microns and 6328 angstroms have been successfully operated during the past quarter. These lasers are of conventional design and the results have demonstrated the soundness of the apparatus and the fabrication techniques. Detailed calculations indicate that the output power of a two-region He-Ne laser

may not be limited by He metastable-metastable ionizing collisions for levels up to about two orders of magnitude higher than are available from conventional gas lasers. The limiting level will be even higher if the cross section is smaller than the pessimistic value assumed in the calculations. The results of further design calculations are also included in this report. Fabrication techniques for a gridded laser tube have been largely developed, and construction is proceeding. Another scheme for achieving higher output powers has been considered, but it poses some practical problems. The two-region laser still seems to offer more promise than any other type of gas laser. (Author)

AD-406 948 Div. 30
(TISTB/WA) OTS price $1.60

Operations Research Inc., Silver Spring, Md.
DESIGN AND DEMONSTRATION OF A MANAGEMENT INFORMATION AND CONTROL SYSTEM FOR THE OFFICE OF CIVIL DEFENSE,
by J. Paul Bowling, Raymond D. Mintz, and T. Arthur Smith. 1963, 9p. TR204
Contract OCD OS62 286
Unclassified report

Descriptors: *Civil defense systems, Intercommunication systems, Procurement, Logistics, Shelters, Radioactive fallout, Models, Control systems, Statistical analysis, Management engineering.

The purpose of this project is to design and demonstrate the feasibility of a management information and control system of CD functions under the jurisdiction of the Assistant Secretary of Defense (Civil Defense). The specified areas of analytical interest are those of communication, problem definition, and policy implementation. (Author)

AD-407 041 Div. 30, 25, 8, 16
(TISTP/MH) OTS price $18.00

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
(No title).
Quarterly progress rept. no. 69,
by H. J. Zimmermann, G. G. Harvey, and W. B. Davenport, Jr. 15 Apr 63, 265p.
Unclassified report

Descriptors: *Research program administration, Microwave spectroscopy, Molecular beams, Radio astronomy, Noise, Plasma physics, Magnetohydrodynamics, Communication theory, Artificial intelligence, Speech transmission, Machine translation, Physics.

AD-407 068 Div. 30, 1
(TISTA/GEC) OTS price $3.60

Joint Parachute Test Facility, El Centro, Calif.
USAF 6511th TEST GROUP (PARACHUTE) AND US NAVAL PARACHUTE FACILITY.
rev. May 63, 31p.
AFFTC TIH63 2001 Unclassified report

Descriptors: *Parachutes, *Cargo parachutes, Drag parachutes, Ribbon parachutes, Flight testing, Parachute descents, Test equipment, Parachute fabrics, Photo theodolites, Tests, Environmental tests, Test facilities.

The purpose of this publication is to describe the Joint Parachute Test Facility operated by the United States Navy and the United States Air Force. The Naval Parachute Facility and the 6511th Parachute Test Group have joined together in the operation and utilization of one testing complex to achieve each service's specific objectives relative to the testing of retardation systems. The equipment and specialized experience available at this organization have been utilized in the solution of particular problems for all military services and also for many industrial organizations. (Author)

AD-407 070 Div. 30
(TISTP/FR) OTS price $10.50

Sylvania Electronic Systems, Needham, Mass.
MOBILE DIGITAL COMPUTER PROGRAM. MOBIDIC D.
Final rept., 1 July 58-1 Feb 63,
by E. W. Jervis. Feb 63, 1v.
Contract DA36 039sc78164, Proj. 3 28 02 201
Unclassified report

Descriptors: *Digital computers, Mobile, Special purpose computers, Data processing systems, Army operations.

A summary of the major activities undertaken during the course of the MOBIDIC D project from its beginning 1 July 1958 through 31 January 1963 is presented. Leading characteristics of the system and of the individual units which make up the system are described. Overall conclusions relating to equipment design together with resultant recommendations are treated. Also summarized are conferences held, lectures given, and publications generated during the life of the project. (Author)

AD-407 174 Div. 30, 8
(TISTP/FEM) OTS price $4.60

Harry Diamond Lab., Washington, D. C.
DIODELESS MAGNETIC CORE LOGIC CIRCUITS,
by Dale L. Hamilton. 15 Aug 62, 50p.
Proj. 46345
HDL Rept. TR1072
Unclassified report

Descriptors: *Ferromagnetic materials, *Magnetic cores, *Computer logic, Magnetic core storage, Mathematical logic, Gates (Circuits), Microminiaturization (Electronics), Hysteresis, Electric currents, Coils, Switching circuits, Circuits.

The ability to perform all the basic logic functions associated with memory, and-gates, or-gates, and not-gates by using circuits composed only of square loop magnetic cores and interconnecting wire is reported. A design procedure is given for all the basic logic circuits, a coincidence detector, and a shift code counter. These circuits were developed using miniature ferrite cores that have switching times on the order of microseconds. (Author)

AD-407 200 Div. 30, 12, 26, 23
(TISTP/JEA) OTS price $5.60

RAND Corp., Santa Monica, Calif.
DETERMINING ECONOMIC QUANTITIES OF MAINTENANCE RESOURCES: A MINUTEMAN APPLICATION,
by Chauncey F. Bell and Milton Kamins. Jan 63, 50p. RM3308PR
Contract AF49 638 700
Unclassified report

Descriptors: *Weapon systems, *Maintainability, Economics, Operation, Job analysis, Malfunctions, Costs, Effectiveness, Reliability, Specification, Time, Training, Guided missiles (Surface to surface).

This Memorandum introduces a technique for com-

puting manpower and equipment requirements that takes into account three critical and frequently overlooked factors. These are: the randomness of the failure pattern -- the uncertainty of the time any particular malfunction will occur; the workshift policy -- when maintenance personnel are on duty; and the cost-effectiveness trade-off -- the marginal increase in system capability weighed against the cost of providing a marginal increase in resources. The quantities of maintenance personnel and ground equipment estimated with the technique presented here will economically meet anticipated requirements within the accuracy limitations of the three inputs necessary to the computation. These are: failure rate or reliability, repair time or maintainability, and cost. (Author)

AD-407 263 Div. 30
(TISTP/FR) OTS price $2.60

Philco Corp., Palo Alto, Calif.
MILESTONE 4 - PROGRAM 823 TRACKING AND COMMANDING OPERATIONAL COMPUTER PROGRAM DESIGN SPECIFICATION. VOLUME 1.
14 June 63, 20p. Rept. no. WDL TR2101, vol. 1
Contract AF04 695 177
Unclassified report

Descriptors: *Command guidance, Tracking, Satellites (Artificial), Programming (Computers), Punched tape, Design.

The design specification is given for the Program 823 specific Tracking and Commanding (T&C) operational computer programs. There is a special commanding module and a special paper tape program associated with the Program 823 T&C Operational Computer Programs. The special Program 823 Commanding module is an additional commanding capability to the Multiple Satellite Augmentation Computer Programs (MSAP). The completed Program 823 T&C Commanding Module will be delivered as a part of the modified MSAP Master Library Tape. The special T&C Paper Tape Program is designed to support Program 823 satellites during an interim period at the Indian Ocean Tracking Station (IOS) when the communication with the Satellite Test Center is via a teletype link. (Author)

AD-407 269 Div. 30
(TISTE/CAM) OTS price $1.60

Harry Diamond Labs., Washington, D. C.
A CAPSTAN-TYPE TORQUE REGULATOR FOR TIMING MOVEMENTS,
by David S. Bettwy. 31 May 63, 19p.
Proj. 46300
HDL TR 1130 Unclassified report

Descriptors: *Torque, *Timing devices, Springs, Sensitivity, Theory, Motion.

A capstan type of torque regulating device is described and test results of its application to a runaway timing movement are presented. (Author)

AD-407 274 Div. 30, 14, 25
(TISTP/FR) OTS price $.75

Harry Diamond Labs., Washington, D. C.
STATISTICAL EVALUATION OF CALORIMETRIC MEASUREMENTS ON HEAT-SOURCE MATERIALS,
by Sheldon G. Levin and Robert E. McIntyre.
28 Mar 63, 27p.
Proj. 75333
HDL TR1028
Unclassified report

Descriptors: *Calorimeters, Calibration, Measurement, Statistical analysis, Organic compounds, Acids, Calibration.

A statistical study was made to determine the precision of calorimetric determinations made on the Parr Model 1411 calorimeter. In addition, the calorific values for continuous-production heat-source material and for an experimentally prepared homogeneous material were determined, and the variability of measurements are compared. It was found that operator-skill and techniques employed can result in a significant increase in the precision of measurements obtained. Procedures intended to increase precision are given. When the determinations with the Parr Model 1411 calorimeter are carefully made, the variance in calorific values due to the calorimetry is small compared to the variance of the determinations made on samples from a typical run of continuous-production heat-source material. (Author)

AD-407 321 Div. 30, 16
(TISTE/CAM) OTS price $1.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
RECORDING INSTRUMENT FOR ENVIRONMENTAL TESTING OF BIOLOGICAL SPECIMENS,
by George H. Kydd and Kenneth H. Dickerson.
26 Mar 63, 9p.
NADC MA6119 Unclassified report

Descriptors: *Electronic recording systems, *Environmental tests, Flowmeters, Gas analysis, Thermistors, Pressure, Temperature, Measurement, Oxygen, Carbon dioxide, Analysis, Life support, Animals.

A description is presented of the modification of a strip chart recorder for use in recording, long term, the conditions of an environmental system used for subjecting animals to gas mixtures in which the oxygen content is varied. Provisions are made for recording four pressures, six temperatures and four 10 mv signals which in this case consist of two gas flow-meters and oxygen and carbon dioxide analysis. (Author)

AD-407 473 Div. 30, 3
(TISTE/JWS) OTS price $3.60

Southwest Research Inst., San Antonio, Tex.
DEVELOPMENT OF A DEVICE TO OBJECTIVELY DETECT AND RECORD THE PRESENCE OF MINUTE AMOUNTS OF GASES IN THE ATMOSPHERE.
Final rept.,
by H. P. Burchfield, R. J. Wheeler, J. D. King and W. VanDerVeer. 13 Mar 63, 30p.
Contract AF30 602 2655, Proj. 5534, Task 553402
RADC TDR63 176 Unclassified report

Descriptors: *Gas detectors, Electrometers, Flames, Gas generating systems, Hydrogen, Transistors, Chlorides, Hydrogen compounds, Flourides, Nitrogen compounds, Chromatographic analysis.

An electro-chemical sensing device has been developed for the measurement of HCl, HF, NO2, and O3. The instrument has a dual flame ionization detector that can also be operated as a single flame. The inorganic gases are converted to organic gases which are then detected with the flame ionization detector. (Author)

AD-407 560 Div. 30
(TISTP/FR) OTS price $1.60

Mitre Corp., Bedford, Mass.
ANTICIPATED CARRY-MAJORITY LOGIC MODE,

by R. A. Knoebel. Apr 63, 6p. TM3370
Contract AF33 600 39852, Proj. 708
ESD TDR63 157
Unclassified report

Descriptors: *Computer logic, Design, Theory, Digital computers.

The use of the majority (2 out of 3) logic element in anticipated carries for adders, multipliers, etc., yields very fast designs with only a moderate number of gates. The general theory of such carries is presented. This is applied to the design of a 48-bit adder. One hundred and sixty-four majority gates give carries for all 48 bits with a maximum of 6 stages of delay. The relationship between delay and quantity of gates required is plotted. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-407 152 Div. 31, 30
(TISTE/JWS) OTS price $17.50

Conesco Inc., Cambridge, Mass.
SHIP HULL VIBRATIONS - 5 ANALYSIS OF HULL STRUCTURES AS APPLIED TO SSB(N) 598 GEORGE WASHINGTON, by F. E. Reed and Elizabeth Cuthill. Mar 63, 83p. F111 2
Contract NObs86111, Proj. S F013 11 01, Task 1351
Unclassified report

Descriptors: *Submarine hulls, *Ballistic missile submarines, Nuclear-powered vessels, Damping, Programming (Computers), Elasticity, Propellers (Marine), Mathematical prediction, Mechanical properties, Resonance, Vibration.

A computer program for determining the natural frequency of a ship hull elastically connected to other elastic systems and to sprung masses and containing concentrated and hysteresis damping is developed. This program is applied to the mass-elastic system that represents the SSB(N) 598 George Washington in detail. The influence upon the hull response to propeller and hull excitation in the stern of variables such as the number of mass points used to represent the hull, the omission of the propulsion subsystem, the stiffness between the propulsion sub-system and the primary hull, the inclusion of the moment of inertia of the hull cross-sections, the treatment of water inertias, the treatment of sprung masses and the amount of hysteresis damping in the hull is shown. A computing machine program that is sufficiently flexible to deal with parallel sub-systems, sprung masses and concentrated and hysteresis damping in axial and bending vibration has been developed. The mass-elastic characteristics of the SSB(N) 598 George Washington have been determined in considerable detail. The effects of various approximations such as omitting the propulsion sub-system, treating sprung masses as rigidly connected, neglecting rotary inertia, representing the hull with a limited number of mass points, spacing the mass points uniformly have been investigated. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-407 182 Div. 32, 28
(TISTB/DGH) OTS price $11.50

Stanford Research Inst., Menlo Park, Calif.
ADAPTATIONS OF SCIENTISTS IN AN INDEPENDENT RESEARCH ORGANIZATION: A CASE STUDY, by Howard M. Vollmer. May 63, 148p.
Contract AF49 638 1028, Proj. 9778, Task 37707
Unclassified report

Technical Report, Phase II a.

Descriptors: *Sociology, *Scientific personnel, *Scientific organizations, Job analysis, Social communications, Personnel management, Recruiting, Standards, Adaptation (Physiology), Research program administration, Attitudes, Motivation, Management engineering, Employee relations, Industrial relations, Wages, Awards, Adjustment (Psychology), Production.

Contents: MANAGERIAL REQUIREMENTS; Perspective of the analysis, The research industry, The Formal goals and structure of Tiros (The Independent Research Organization Studied), Implementation of goals at Tiros, and Specific managerial requirements; EMPLOYEE PERSPECTIVES; Employee perspectives and managerial requirements--publication, Employee perspectives and other managerial requirements, Employee interests and experiences, and Conflict problems at Tiros; INCENTIVES; The satisfaction-productivity problem, Types of incentives at Tiros, Incentives and over-all job satisfaction, and Incentives and professional productivity; RECRUITMENT AND DISPLACEMENT; The recruitment and displacement problem at Tiros, Sources of new employees, Educational level of new employees, and Age level of new employees; SOCIALIZATION; Socialization at Tiros, Socialization and managerial requirements, Differential socialization, and Socialization and other managerial mechanisms; ENTREPRENEUSHIP; Entrepreneurship at Tiros, Characteristics of entrepreneurs, and Consequences of entrepreneurship; NON-FORMALIZED RESEARCH; Non-formalized research at Tiros, and Consequences of non-formalized research; STATUS ADVANCEMENT; Status advancement at Tiros, and Consequences of status advancement; SUMMARY AND CONCLUSIONS.

AD-407 444 Div. 32
(TISTB/DGH) OTS price $8.10

TRW Computers Co., Canoga Park, Calif.
FULCRUM TECHNIQUES TO SEMANTIC ANALYSIS.
Final rept.
5 Mar 63, 74p. C169 3U5
Contract AF30 602 2643, Proj. 4599, Task 459901
RADC TDR63 168 Unclassified report

Descriptors: *Language, *Machine translation, Programming (Computers), Classification, Dictionaries, Statistical analysis, Analysis.

A new semantic research technique was developed and employed. This technique makes possible the construction of semantic classes of words which share the characteristic of specifying a particular translation for a given polysemantic Russian content word. Improvements were made in the RW program for the areas of subject recognition and clause boundary determination. Conclusions were reached about an improved English synthesis. The latter involves reformulating Russian structures into appropriate but non-corresponding English structures. The major hardware implication of the research suggests that associative memories may provide a simplification in the area of machine translation. Flow charts and a sample translation are included. (Author)

AD-407 562 Div. 32
(TISTB/JAB) OTS price $13.00

Mitre Corp., Bedford, Mass.
MARK I EXPERIMENTAL CORPUS AND DESCRIPTOR SET

FOR THE STATISTICAL ASSOCIATION PROCEDURES FOR MESSAGE CONTENT ANALYSIS,
by J. Spiegel. Apr 63, 1v. Rept. no. SR79, Suppl. 1
Contract AF33 600 39852, Proj. 702
ESD TDR63 159 Suppl. 1 Unclassified report

Descriptors: *Information retrieval, Programming (Computers), Abstracting, Documentation.

This supplement to TDR-63-159 describes the corpus initially used for experiments with the Statistical Association Procedures for Message Content Analysis Program. The ASTIA TABs served as a source from which the initial experimental corpus was drawn. (Author)

AD-407 609 Div. 32
(TISTP/RD) OTS price $12.00

Air Force Materials Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
PROCEEDINGS SYMPOSIUM ON MATERIALS INFORMATION RETRIEVAL.
May 63, 159p.
AF Proj. 7381, Task 738103
ASD TDR63 445 Unclassified report

Papers presented at the Symposium on Information Retrieval, 28-29 Nov 1962, at Dayton, Ohio.

Descriptors: *Information retrieval, *Symposia, Subject indexing, Documentation.

AD-407 625 Div. 32, 30
(TISTB/JAB) OTS price $11.50

Cambridge Language Research Unit (Gt. Brit.).
INTER-LINGUAL SYNTAX BRACKETTING PROGRAMS,
by D. S. Linney. 30 Mar 63, 1v. ML165
Contract AF61 052 542
AFOSR 4741 Unclassified report

Descriptors: *Language, Analysis, Computer.

33. TRANSPORTATION

AD-407 320 Div. 33, 31
(TISTE/CAM) OTS price $2.60

System Development Corp., Santa Monica, Calif.
A MODEL FOR MARITIME TRANSPORTATION SYSTEMS,
by Paul B. Billing and J. E. Walsh. 26 Apr 63, 19p. SP1053 000 01
Unclassified report

Descriptors: *Merchant vessels, *Commerce, *Simulation, *Transportation, Cargo vessels, Mathematical models, Tankers, Costs, Scheduling, Operation, Damage, Cargo, Economics, Effectiveness, Water traffic.

A model for maritime transportation systems is presented. Procedures are outlined for quantifying and interrelating the many factors that are involved in a worldwide maritime operation over a given period of time. In broad terms, the simulation model consists of the inputs to the over-all maritime system, a method of determining the operation of the system on the basis of these inputs, and the outputs that result from this operation. Some of the inputs and system interrelations are controlled by the nation whose maritime operation is being considered for improvement. An evaluation criterion is used for representing the over-all desirability of the system outputs from the viewpoint of this nation. Then, on a parametric analysis basis, a study can be made with respect to the choice of inputs and interrelations (of those controlled) that are most desirable for this nation. Methods are outlined for deciding on inputs that are not controlled and for efficiently performing the simulations. (Author)

AD-407 627 Div. 33, 19, 1
(TISTA/GEC) OTS price $3.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
ACTIVITY REPORT.
Feb 62, 31p.
ESD TDR62 20 Unclassified report

Descriptors: *Air traffic control systems, *Landing aids, Glide path systems, Instrument landings, Lighting, Runways, Approach lights, Communications systems, Navigation aids, Helicopters, Data processing system, Research program administration.

Contents:
Approach and landing systems
Communications
Data acquisitions and processing
Navigation
Helicopter operations
Research division activities
Simulation
Aircraft safety
Weather

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

AGRICULTURE

NAS-NRC-1040
Available free from NAS-NRC

Committee on Animal Nutrition, National Research Council, Washington, D. C.
NUTRIENT REQUIREMENTS OF DOMESTIC ANIMALS. GLOSSARY OF ENERGY TERMS, by Lorin E. Harris. 1962, 8p. 12 refs.

DESCRIPTORS: *Animals, *Nutrition, Energy, *Dictionaries.

This Glossary of Energy Terms is published for use as a reference in connection with the series of published reports on Nutrient Requirements of Domestic Animals. In November 1958, the Committee on Animal Nutrition passed resolution to start using the calorie system along with the total digestible nutrient (TDN) system to describe the energy values of feeds, rations, and nutrient requirements of animals. All reports on nutrient requirements of domestic animals published since 1958 have carried both TDN and apparent digestible energy values. The Joint United States-Canadian Tables of Feed Composition also carry data on the metabolizable energy content of feedstuffs. As soon as sufficient data can be obtained on the gross, apparent digestible, metabolizable, and net energy values of feeds, rations, and nutrient requirements of animals, the TDN values will be dropped.

NAS-NRC-982
Order from NAS-NRC $15.00

Committee on Plant Breeding and Genetics, National Research Council, Washington, D. C.
STATISTICAL GENETICS AND PLANT BREEDING. A SYMPOSIUM AND WORKSHOP HELD MARCH 20-29, 1961 AT NORTH CAROLINA STATE COLLEGE, RALEIGH, N. C., ed. by W. D. Hanson and H. F. Robinson. 1963, 638p. 545 refs.

DESCRIPTORS: *Conferences, *Plants (Botany), *Reproduction (Physiology), *Genetics, *Statistical analysis, Population, Models(Simulations), Vector analysis, Laboratory animals, Grasses, Barley, Corn.

Contents:
Part I - Symposium
Biological and statistical concepts of genetic theory
Estimation and interpretation of genetic parameters
Progress from selection
Genetic parameters - experimental estimates and their applications
Selection programs
Part II - Workshop
Quantitative genetic concepts
Problems in selection
Quantitative genetic studies with polyploids
Interplant competition
Diallel analysis
Genetic diversity, heterosis, and use of exotic stocks
Estimation of genetic variances and heritability

ASTRONOMY

LADC-5597 OTS $3.60

Los Alamos Scientific Lab., N. Mex.
FORMATION AND EVOLUTION OF THE SUN, by Robert R. Brownlee. Rept. on Contract W-7405-eng-36. [1961] 31p.

NAS-NRC-1079
Order from NAS-NRC $4.00

Space Science Board, National Research Council, Washington, D. C.
A REVIEW OF SPACE RESEARCH, by Harry H. Hess, Lloyd V. Berkner and others. Rept. of the summer study conducted at the State U. of Iowa, 17 June-10 Aug 62. 1962, 578p. 12 refs. NASA N63-11562.

DESCRIPTORS: *Conferences, *Astronomy, *Space flight, *Satellites (Artificial), *Moon, *Planets, *Lunar craft, Lunar probes, *Planetary atmospheres, Upper atmosphere, Sky brightness, Aurorae, Sounding rockets, *Radio astronomy, Radar, *Space environmental conditions, Magnetic fields, Solar wind, Solar radiation, Van Allen radiation belt, *Meteorological satellites, *Space biology, Exobiology, Astronauts, Closed-cycle ecological systems, *Space probes, Decontamination, *Manned spacecraft, *Payload, *Scientific satellites, *Universities, Scientific organizations, *Social sciences, Sociology, Psychology, Economics.

Introduction and summary
Astronomy
Celestial mechanics
Lunar and planetary research
Atmospheres of the solar system
Bistatic radar astronomy
Particles and fields
Meteorological rockets and satellites
Biology
Space probe sterilization
The scientific role of man in space exploration
NASA/university relationships
Block allocation of payload space
Scientific uses of spacecraft launched by other federal agencies
International cooperative programs
Some social implications of the space program
Briefings on the NASA space science program.

Astrophysics

NASA N63-17550 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
COSMIC-RAY-INDUCED STABLE AND RADIOACTIVE NUCLIDES IN METEORITES, by Michael E. Lipschutz. June 63, 12p. 38 refs. NASA TN D-1844.

NASA N63-18131 OTS $1.25

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
EARTH REFLECTED SOLAR RADIATION INCIDENT UPON AN ARBITRARILY ORIENTED SPINNING FLAT PLATE, by Fred G. Cunningham. July 63, 39p. 8 refs. NASA TN D-1842.

NASA N63-17226 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PRELIMINARY RESULTS FROM MARINER-II SOLAR PLASMA EXPERIMENT, by Marcia Neugebauer and Conway W. Snyder. Rept. on NASA Contract NAS7-100. 15 Nov 62, 11p. 11 refs. JPL TM-33-111; NASA CR-50065.

NASA N63-18128 OTS $1.25

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
ON A CONSISTENT SYSTEM OF ASTRODYNAMIC CONSTANTS, by Helmut G. L. Krause. July 63, 49p. 58 refs. NASA TN D-1642.

BEHAVIORAL SCIENCES

AD-279 541 OTS $2.60

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
PREDICTION OF VIGILANCE: AASHO ROAD TEST, by D. A. Dobbins, D. M. Skordahl, and A. A. Anderson. Rept. on Error Free Performance c-01. Dec 61, 30p. 8 refs. Technical research note 119.

DESCRIPTORS: *Attention, Roads, *Performance tests, Personality, Perception, Aptitude tests, Statistical analysis.

This report describes the second of two studies of vigilance in connection with a road test sponsored by the American Association of State Highway Officials (AASHO) and administered by the Highway Research Board of the National Academy of Sciences. Army drivers operated trucks over experimental highways (Nov 1958 to Nov 1960) under conditions conducive to boredom and fatigue--characteristic of many Army monitoring jobs. The primary objective of this study was to determine which, if any, of several well-known psychological domains hold most promise for prediction of vigilance performance. A total of 39 predictor and 2 reference measures, grouped into 8 predictor clusters and a single reference cluster, were administered. In general, both reliability and validity coefficients were low. The most promising predictors were the Personality, Personal History, Driver Aptitude, and Perceptual Speed clusters. The Cognitive, Physical, Psychomotor, and Attitudinal clusters were least promising. In spite of large and fairly stable individual differences in detection performance, the highly specific nature of the criterion and possible subject-task interaction appears to restrict the utility of standard general psychological predictors. Measures paralleling more closely parameters of the criterion task--signal rates, intersignal intervals, sensory modes--might be expected to show greater promise. (Author)

Human Engineering

PB 163 347 OTS $2.60

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
HUMAN ENGINEERING INVESTIGATIONS OF AIRCRAFT COCKPIT VISUAL DISPLAYS. PART 18. SIZE AND SHAPE OF NUMERALS AND LETTERS FOR DISPLAYS. I. PERCEPTUAL DEVELOPMENT WITH SINGLE AND MULTIPLE, STRAIGHT AND CURVED LINE FORMS, by John Gaito. 15 Oct 57, 30p. 18 refs. Rept. no. NAMC-ACEL-351; TED NAM AE-7047; AD-144 893.

DESCRIPTORS: *Display systems, *Numbers, Printing, Geometric forms, *Perception, Vision, Human engineering, *Flight instruments, Instrument dials, Instrument panels, *Cockpits, Aircraft.

Three experiments concerned with perceptual development of single and multiple straight and curved line figures are reported. The four stimuli (a single straight line, a single curved line, two straight lines making an angle of approximately 140 degrees, and three perpendicular straight lines) were presented in an electronic tachistoscope at increasing time intervals at a constant low luminance level until the subject correctly identified the figure. Analyses by the analysis of variance and content analysis techniques indicated that the straight line was perceived at the lowest time interval; the two multiple straight line forms at the highest time interval; the two multiple straight line forms, at the highest time interval; and the curved line, at an intermediate time interval. Statements concerning the implication of these findings for the development of letter and numeral fonts for aircraft displays are offered. (Author) (See also PB 146 505)

PB 163 348 OTS $7.60

Psychological Lab., Johns Hopkins U., Baltimore, Md.
ON SOME RELATIONS BETWEEN HUMAN ENGINEERING, OPERATIONS RESEARCH AND SYSTEMS ENGINEERING, by Alphonse Chapanis. Rept. no. 8 on Contract Nonr-248(55). 13 May 60, 75p. 22 refs. AD-238 143.

DESCRIPTORS: *Operations research, *Human engineering, Machines, Design, Theory, Scientific research, *Cybernetics, *Systems engineering.

Contents;
Some relations between human engineering and systems engineering
The allocation of functions to human and machine components
The assignment of functions to men or machines
The role of research in the assignment of functions
Continuous re-evaluation of assignment decisions
The human engineering of systems components
Systems evaluation
Some relations between human engineering and operations research
Influences of OR decisions on systems engineering and human engineering
The validation of assumptions involving human variables
Some implications of the systems point-of-view for human engineering
The generality of many human engineering data
The design of scales
The redesign of a control
On costs and other systems criteria
The OR evaluation of human engineering principles
The need for realistic comparative data
On finding systems-relevant criteria

PB 163 388 OTS $1.60

Psychological Research Associates, Inc., Arlington, Va.
HUMAN FACTORS STUDIES IN SAGE. Interim rept. on Contract AF 19(604)5616. Feb 60, 11p. PRA rept. no. 60-7; AD-234 569.

DESCRIPTORS: *Antiaircraft defense systems, *Job analysis, Achievement tests, *Height finding, *Radar operators, *Radar tracking, Lighting equipment, Cybernetics, *Human engineering, Aviation personnel.

Contents:
Task equipment analysis (TEA)
Paper-and-pencil tests
IND functional tests
Height-finding functional tests
Direction center lighting

PB 163 386 OTS $4.60

Psychological Research Associates, Inc., Arlington, Va.
SAGE TASK-EQUIPMENT ANALYSIS: AIR SURVEILLANCE OFFICER-AIR SURVEILLANCE TECHNICIAN, by John T. McLaughlin and Melvin R. Marks. Rept. on Contract AF 19(604)5616. Apr 60, 45p. PRA rept. 60-10; AFCRC-TN-60-53; AD-236 613.

DESCRIPTORS: *Tracking, Analysis, *Radar operators, Air defense command, *Human engineering, Aviation personnel, Officer personnel, *Job analysis.

This report describes the operation of the Air Surveillance Officer-Air Surveillance Technician team in the Boston Air Defense Sector (BOADS) of the SAGE System. The analysis is concerned with delineating the interface between man and machine or, in other terms, describing the relationship between the equipment to be operated and the task of the operators. The present report is one of a series which, ultimately, will cover almost all of the positions in a SAGE Direction Center, and some of the positions in a SAGE Combat Center. (Author)

PB 163 387 OTS $6.60

Psychological Research Associates, Inc., Arlington, Va.
SAGE TASK-EQUIPMENT ANALYSIS: INTERCEPT DIRECTOR-INTERCEPT DIRECTOR TECHNICIAN, by George B. Warburton, Jr., Kenneth A. Lawrence, and Melvin R. Marks. Rept. on Contract AF 19(604)5616. Feb 60, 70p. PRA rept. 60-4; AFCRC-TN-59-76; AD-234 570.

DESCRIPTORS: *Antiaircraft defense systems, *Job analysis, *Radar operators, Perception, Reaction (Psychology), Cybernetics, Aviation personnel, *Human engineering.

The operation of the Intercept Director-Intercept Director Technician team in the Boston Air Defense Sector (BOADS) of the SAGE system is described, and the relationship between the equipment to be operated and the task of the operator is delineated. (Author)

PB 163 385 OTS $2.60

Psychological Research Associates, Inc., Arlington, Va.
STUDIES ON HEIGHT-RANGE INDICATOR OPERATOR PERFORMANCE, by Frederic D. Weinfeld, John T. McLaughlin, and Melvin R. Marks. Rept. on Contract AF 19(604)5616. Apr 60, 28p. 1 ref. PRA rept. 60-9; AFCRC-TN-60-54; AD-235 142.

DESCRIPTORS: *Radar operators, *Height finding, Test methods, *Human engineering, *Cybernetics, Training, *Range finding, Errors.

Various studies, tests, and experiments conducted during an investigation of the human factors involved in Height-Range Indicator Operator (HRIOp) performance are described. The degree to which negative height replies could be attributed to operator performance as opposed to environmental conditions prevailing within the height-finding system was determined. These studies culminated with an investigation of the degree to which HRIOp performance could be improved as a result of an experimentally induced increase in motivation. Specific recommendations with respect to improving HRIOp performance are presented. (Author)

NAS-NRC-1094
Order from NAS-NRC OTS $2.00

Institute of Laboratory Animal Resources, National Research Council, Washington, D. C.
LABORATORY ANIMALS. II. ANIMALS FOR RESEARCH, by Berton F. Hill, Mary B. Sundborg, and Ann L. Jones. Rept. on PHS Grant GM-03991 and Contracts N7onr-291(46) and AT(49-1)643. Revised June 63, 104p. 3 refs.

DESCRIPTORS: *Laboratory animals, *Directories, Laboratory equipment, Biological laboratories.

A directory of commercial sources of laboratory animals, equipment, and materials.

UCRL-10589 OTS $0.50

Lawrence Radiation Lab., U. of California, Berkeley.
CLOSED ECOLOGICAL LIFE-SUPPORT UNIT FOR PRIMATES, by Mitchell Sabanas. Rept. on Contract W7405-eng-48. 10 Dec 62, 21p. NASA N63-13073.

UCRL-10640 OTS $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
STABLE-FLOW FREE-BOUNDARY MIGRATION AND FRACTIONATION OF CELL MIXTURES: SEDIMENTATION AND ELECTROPHORESIS, by Howard C. Mel. Rept. on Contract W7405-eng-48. 23 Jan 63, 77p. 64 refs. NASA N63-15319.

PB 163 328 OTS $1.60

Medical Coll. of Virginia [Richmond].
THE TOXICITY AND PHARMACOLOGY OF HYDRAZINO COMPOUNDS AND OF CERTAIN MIXTURES CONTAINING HYDRAZINE, by J. H. Weatherby, H. McKennis, and Lloyd Witkin. Rept. on Contract DA 18-108-CML-208. 11 Apr 56, 17p. Chemical Warfare Labs. rept. no. 2015; AD-97 092.

DESCRIPTORS: *Toxicity, Pharmacology, *Drugs, *Hydrazines, *Hydrazine derivatives, Ammonia, Blood, Cerebrospinal fluid.

It was found that there was a marked increase in both blood and spinal fluid ammonia following hydrazine (50 mg./kg., I.V.) but could not explain why the increase occurred. Methylhydrazine, 1,2-dimethylhydrazine and 1,1-dimethylhydrazine caused no important increase in blood ammonia; 1,2-dimethylhydrazine caused a decrease. A 150 mg./kg. dose of isonicotinylhydrazine decreased blood ammonia after two hours, but increased it after five hours. Spinal fluid ammonia was also increased after such a dose. The investigators also determined the acute toxicity by inhalation of furfuryl alcohol, aniline, and hydrazine both individually and in mixtures. Similarly, the intraperitoneal toxicity was determined and the general analytical procedures were described. (Author)

NAS-NRC-996
Order from NAS-NRC $6.50

National Research Council. Div. of Medical Sciences, Washington, D. C.
TROPICAL HEALTH. A REPORT ON A STUDY OF NEEDS AND RESOURCES. Rept. on Contract DA 49-193-MD 2078 and PHS Grant E 2519 (C1, C2, C2S1 and C3). 1962, 567p. 640 refs.

DESCRIPTORS: *Tropical regions, Public health, Tropical diseases, *Communicable diseases, *Parasitic infections, Vital statistics, Animals, Zoonoses, *Epidemiology, Medical personnel, Hospitals, Mental diseases.

Contents:
Significant human diseases in tropical and subtropical areas--preliminary considerations
Diseases of high endemicity
Diseases of relatively low but potentially great endemicity
Diseases of relatively low endemicity but high mortality or serious complications
New diseases, the present knowledge of which is limited
Control of disease in the survey areas
Significant diseases of domestic animals in tropical and subtropical areas
Resources for health and medical care
Tropical health and the economy of the United States
The impact of travel and migration on tropical disease problems
Research programs in the United States in medical and hygienic problems of the tropics
Foreign research in medical and hygienic problems of the tropics
Research grant programs in tropical health
Fellowship programs in tropical medicine
Teaching of tropical medicine and hygiene
Training facilities in the field of tropical medicine and hygiene
Career opportunities and incentives
Future manpower needs in the field of tropical health
Research needs in medical and hygienic problems of the tropics: An assembly of informed opinion

TID-17611 OTS $5.60

Pittsburgh U., Pa.
STUDIES ON THE PRODUCTIVITY OF VASCULAR HYDROPHYTES AND THEIR ROLE IN MINERAL CYCLING IN AQUATIC ECOSYSTEMS, by Richard T. Hartman. Progress rept., 15 Apr 62 15 Jan 63, on Contract AT(30-1)3018. 15 Jan 63, 53p. 6 refs.

TID-17697 OTS $1.10

Texas U., Austin.
A STUDY OF THE GENETIC AND BIOCHEMICAL EFFECTS OF RADIATION ON BACTERIA. Final rept., 1 July 53-30 Sep 62, on Contract AT(40-1)1649. 10p. 10 refs.

Radiobiology

NAS-NRC-1078
Order from NAS-NRC $2.00

Advisory Committee on Civil Defense, National Research Council, Washington, D. C.
DAMAGE TO LIVESTOCK FROM RADIOACTIVE FALLOUT IN EVENT OF NUCLEAR WAR. 1963, 97p. 216 refs.

DESCRIPTORS: *Animals, Agriculture, *Radioactive fallout, *Nuclear warfare, *Fission product poisoning, Gamma rays, Beta particles, *Food, *Embryos, *Radioprotective agents, *Shielding, Health physics.

Contents:
Introduction
Effects of external ionizing radiation on farm animals
Effects from ingestion of fission products
Internal exposure to gamma and beta rays
Effects of contact with radioactive materials
Animals and poultry as sources of food
Exposure of marine life
Sterility, sexual, genetic, and embryologic effects
Protective considerations for husbandmen
Research needs

NASA N63-18217 OTS $1.60

Aerospace Information Div., Washington, D. C.
RADIATION EFFECTS ON BIOLOGICAL MATERIALS, by I. V. Vysochina and others. 24 June 63, 11p. AID Press no. 996.

Review of 10 articles in Radiobiologiya (USSR) 1963, v. 3, no. 2.

TID-7652(Bks 1&2) OTS $7.00

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
PROCEEDINGS OF THE SYMPOSIUM ON THE PROTECTION AGAINST RADIATION HAZARDS IN SPACE, held in Gatlinburg, Tennesses, Nov 5-7, 1962. Book 1: RADIATION ENVIRONMENT IN SPACE: EFFECTS OF SPACE RADIATION ON RADIOSENSITIVE OBJECTS: BIOLOGICAL EFFECTS OF SPACE RADIATIONS. BOOK 2: SHIELDING AGAINST SPACE RADIATIONS. 1963. 898p. 475 refs. NASA N63-(15114-15137); N63-(15138-15159).

TID-17676 OTS $1.10

Brown U., Providence, R. I.
FURTHER INVESTIGATIONS CONCERNING THE EFFECTS OF COSMIC RAY HEAVY NUCLEI AND OF MICROBEAMS ON MAMMALIAN SKIN, by Herman B. Chase. Progress rept. 1 Jan-31 Dec 62, on Contract AT(30-1)2018. 27 Dec 62, 5p. 1 ref.

NAS-NRC-1092
Order from NAS-NRC OTS $1.00

Committee on Effects of Atomic Radiation on Agriculture and Food Supplies, National Research Council, Washington, D. C.
THE BEHAVIOR OF RADIOACTIVE FALLOUT IN SOILS AND PLANTS, by M. H. Frere, R. G. Menzel and others. 1963, 36p. 142 refs.

DESCRIPTORS: *Radioactive fallout, *Soils, Radiological contamination, *Plants (Botany), Radiation effects, Bibliographies.

Contents:
Relative availability of fallout constituents
Soil reactions
Plant relations
Radiation effects
Soil-plant relations
Management.

XDC-59-8-179 OTS $2.60

General Electric Co., Cincinnati, Ohio.
CONVERSION OF NEUTRON OR GAMMA RAY FLUX TO ABSORBED DOSE RATE, by B. J. Henderson. 14 Aug 59, 23p. 5 refs.

HW-SA-2879 OTS $3.60

Hanford Atomic Products Operation, Richland, Wash.
SOME BIO-MEDICAL APPLICATIONS OF RADIOISOTOPES, by L. K. Bustad and R. O. McClellan. Rept. on Contract AT(45-1)1350. [1961] 39p. 35 refs.

UCRL-10559 OTS $0.50

Lawrence Radiation Lab., U. of California, Berkeley.
NEUTRON TISSUE DOSE AT LARGE DISTANCES FROM AN ELEVATED UNSHIELDED REACTOR, by Henry Aceto, Jr., Michael A. Pick, and Lloyd D. Stephens. Rept. on Contract W7405-eng-48. 11 Mar 63, 17p. 10 refs. NASA N63-16035.

UR-614 OTS $3.60

Rochester U. School of Medicine and Dentistry, N. Y.
PREPARATION AND HUMAN TRACER STUDIES WITH I^{131} LABELED ANTIBODY REACTING WITH FIBRIN, by Irving L. Spar, William F. Bale and others. Rept. on Contract W7405-eng-49. 3 July 62, 33p. 13 refs.

CHEMISTRY

NYO-10144 OTS $1.10

Air Reduction Co., Inc., Murray Hill, N. J.
RESEARCH ON APPLICATIONS OF KRYPTON-85, by W. G. Marancik and H. B. Fleishman. Quarterly progress rept. no. 4, 1 July 30 Sep 62, on Contract AT(30-1)2906. 7p. 5 refs.

TID-4005(Pt. 2A) OTS $3.50

Atomic Energy Commission. Div. of Research, Washington, D. C.
SUMMARIES OF THE USAEC BASIC RESEARCH PROGRAM IN CHEMISTRY (OFF SITE). Mar 63, 278p.

NAA-SR-6385 OTS $1.10

Atomic International, Canoga Park Calif.
THEORY OF METAL SURFACE TENSIONS. AN IONIC-SALT MODEL FOR LIQUID METALS, by S. W. Mayer. Rept. on Contract AT(11-1)GEN-8. 30 June 61, 10p. 10 refs.

NASA N63-17215 OTS $1.60

Detroit U., Mich.
SYNTHESIS OF PORPHINE-LIKE SUBSTANCES DURING CHEMICAL EVOLUTION, by Anton Szutka. Rept. on NASA Grant NsG-226-62. [1962] 15p. 28 refs. NASA CR-50200.

LAMS-2674 (Pt. I) OTS $8.60

Los Alamos Scientific Lab., N. Mex.
A CRITICAL REVIEW OF REFRACTORIES, PART I, SELECTED PROPERTIES OF GROUP 4a, -5a, AND AND -6a CARBIDES, by Edmund K. Storms. Rept on Contract W7405-eng-36. 1 Feb 62, 93p. 238 refs.

Analytical Chemistry

PB 163 249 OTS $1.60

[Army Chemical Corps, Army Chemical Center, Md.]
DETECTION AND IDENTIFICATION OF CYANIDES AND OTHER CYANOGEN COMPOUNDS: PYRAZOLONE-PYRIDINE METHOD, by Bernard Gehauf, Melvin M. Falkof, and Benjamin Witten. 1 June 44, declassified 11 Jan 56. 18p. 3 refs. Memorandum rept. T.D.M.R. T.D.M.R. 847.

DESCRIPTORS: *Chemical warfare agents, *Cyanides, *Cyanogen, *Gas detectors, Gels, Chemical indicators, *Pyrazolone, *Pyridines.

IDO-14605 OTS $2.75

Phillips Petroleum Co., Idaho Falls.
ANNUAL REPORT OF DIVISION ANALYTICAL BRANCH FOR 1962, by Ralph C. Shank. Rept. on Contract AT(10-1)205. Apr 63, 172p. 53 refs. NASA N63-18014.

Inorganic Chemistry

PB 163 338 OTS $3.60

Indiana U. [Bloomington].
AN EXPERIMENTAL INVESTIGATION ON THE CHEMISTRY AND INTERCONVERSION OF BORON HYDRIDES, by Riley Schaeffer. Final rept., 1 July 59-31 Aug 60, on Contract AF 33(616)5827. Dec 60, 36p. 18 refs. ARL Technical rept. 60-334; AD-252 810.

DESCRIPTORS: *Diboranes, *Pentaboranes, Hydrides, *Borohydrides, Organoboranes, Boron compounds, Chemical reactions, Synthesis (Chemistry), Pyrolysis, Amines, Lithium compounds, Mercury compounds, Deuterated compounds, Decaboranes.

A modification of the method of Shapiro for the preparation of diborane has been developed which gives nearly quantitative yields of essentially pure diborane. Experimental studies of steps in the thermal conversion of diborane to pentaborane-11 have been continued. The isotope effect in the decomposition of diborane suggests that the hydrogen is eliminated in the initial rate limiting step. An analysis of the subsequent fate of the triborane-7 molecule supports the belief that tetraborane-10 is next formed. Study of the conversion of tetraborane-10 to pentaborane-11 previously suggested the importance of the tetraborane-8 molecule. Support has been offered for this interpretation by study of the decomposition of tetraborane-10 in the presence of carbon monoxide. Preliminary studies of the reaction of diborane with lithium amalgam are also reported. (Author) (See also PB 161 479)

TID-17968 OTS $1.10

Michigan State U., East Lansing.
SOME ASPECTS OF THE STRUCTURE AND STABILITY OF THE CUBIC HEXABORIDES OF THE LANTHANONS, by George D. Sturgeon and Harry A. Eick. Rept. on Contract AT(11-1)716. [1961] 10p. 21 refs.

Physical Chemistry

NASA N63-17544 OTS $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
STUDY OF THE NONEQUILIBRIUM FLOW FIELD BEHIND NORMAL SHOCK WAVES IN CARBON DIOXIDE, by John T. Howe, John R. Viegas, and Yvonne S. Sheaffer. June 63, 40p. 18 refs. NASA TN D-1885.

TID-17726 OTS $4.60

Argonne National Lab., Ill.
STRUCTURAL ASPECTS OF ORGANOPHOSPHORUS EXTRACTANTS AND THEIR METALLIC COMPLEXES AS DEDUCED FROM SPECTRAL AND MOLECULAR WEIGHT STUDIES, by J. R. Ferraro and D. F. Peppard. Rept. on Contract W31-109-eng-38. Sep 62, 42p. 67 refs. UAC-6955.

TID-17721 OTS $4.60

Illinois U., Urbana.
PROPERTIES OF He^3 AT PRESSURES GREATER THAN THE MINIMUM IN THE MELTING CURVE, by A. C. Anderson, W. Reese, and J. C. Wheatley. Rept. on Contract AT(11-1)1198. [1962] 41p. 23 refs.

NASA N63-18233 OTS $0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
THERMAL DECOMPOSITION OF SOME LINEAR PERFLUOROALKANES IN AN INCONEL BOMB, by William L. Fielder. July 63, 16p. 5 refs.
NASA TN-D-1744.

PB 163 329 OTS $6.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SOLAR REGENERATIVE CHEMICAL SYSTEM, by H. P. Silverman. Semiannual rept. no. 3, 1 July-30 Dec 60, on Contract DA 36-039-sc-85245. [1961] 68p. 11 refs. Rept. no. LMSD-895034; AD-254 841.

DESCRIPTORS: *Fuel cells, Solar energy, Electrochemistry, Thermochemistry, Iodine, Thermodynamics, Ascorbic acid, Cadmium, Photosensitivity, *Photochemical reactions, *Electric power production, Power supplies.

Experimental results of photochemical and thermochemical approaches for converting solar energy to electrical energy are reported. Thermodynamic calculations demonstrating the desirability of the cadmium, iodine system as a thermal regenerative system are presented. Initial measurements of the electrochemical parameters including exchange current densities and Tafel slopes as a function of iodine pressure are reported. The first results obtained from the operation of a complete photoregenerative cycle are presented. Data on the stability of the photosensitive chemical system (proflavine-ascorbic acid) indicating stability and long cycle life, as well as the effect of such parameters as pH, concentration of components, and time of exposure are also given. The theoretical background of the photoelectrochemical process is discussed with some experimental results on the relationship between photobleaching and photopotential. (Author)

LADC-5634 OTS $1.10

Los Alamos Scientific Lab., N. Mex.
THE ELECTROCHEMICAL SEPARATION BEHAVIOR OF PROMETHIUM AT A LITHIUM AMALGAM CATHODE, by E. I. Onstottt. Rept. on Contract W7405-eng-36. [1962] 7p. 5 refs.

TID-17725 OTS $2.60

Michigan U., Ann Arbor.
ORGANIC POLAROGRAPHY, by Philip J. Elving. Rept. no. 74 on Contract AT(11-1)1148. 31 Dec 62, 25p. 10 refs.

TID-17741 OTS $2.60

Michigan U., Ann Arbor.
POLAROGRAPHY, by Charles L. Rulfs and Philip J. Elving. Rept. no. 73 on Contract AT(11-1)1148. 15 Dec 62, 25p. 7 refs.

TID-17743 OTS $2.60

Physics Engineering Chemistry Corp., Boulder, Colo.
THE SPECTRUM, THE EXCITATION AND IONIZATION CROSS-SECTIONS FOR PHOTO PROCESSES AND FOR COLLISIONS, OF FIVE TIMES IONIZED OXYGEN, by Carlos M. Varsavsky. Quarterly rept. no. 6, 1 Sep-30 Nov 62, on Contract AT(11-1)1017. 21p. 9 refs.

EARTH SCIENCES

NAS-NRC-1036
Order from NAS-NRC $10.00

American Geophysical Union, Washington, D. C.
ANTARCTIC RESEARCH: THE MATTHEW FONTAINE MAURY MEMORIAL SYMPOSIUM, ed. by H. Wexler, M. J. Rubin, and J. E. Caskey, Jr. 15 Oct 62, 293p. 349 refs. Geophysical Monograph no. 7.

DESCRIPTORS: *Antarctic regions, *Geography, *Geology, Lakes, Ocean bottom topography, *Marine geology, *Ionosphere, *Oceanology, *Jet streams (Meteorology), *Heat transfer, *Glaciers, *Ice, Earth, Thermal conductivity, Thermal diffusion, Particles, New Zealand, Argentina, *Meteorology, *Upper atmosphere.

Contents:
Glacial and subglacial geography of Antarctica; the geology of Antarctia; the geology of Cape Evans and Cape Royds, Ross Island, Antarctica; geology of Lake Vanda, Wright Valley, South Victoria Land, Antarctica; crustal structure in Antarctica; outlines of southern ocean geomorphology; bottom sediments of the Antarctic Antarctic; morphology and some interpretation of geomagnetic variations in Antarctica; the ionosphere over Antarctica; auroral research in antarctic regions; mean westerly jet streams in the Southern Hemisphere; atmospheric advection and the Antarctic mass and heat budget; on the dependence of the character of the boundary between Antarctic and sub-Antarctic Pelagic Zones on the meteorological conditions; on heat exchange of the Antarctic waters; studies on physical oceanography in the Ross Sea by the New Zealand oceanographic institute; preliminary studies and results of the oceanographic work in the Weddell Sea Area; glaciological phenomenon in the Bellingshausen Sea during the 1959-60 Antarctic campaign; the amount of ice on planet earth; glaciology of Antarctica; the thermal diffusivity and thermal conductivity of glacial ice at Wikes Station, Antarctica; the dynamics of ice shelves; New Zealand glaciology; Argentine glaciology.

NAS-NRC-1035
Order from NAS-NRC $8.00

American Geophysical Union, Washington, D. C.
THE CRUST OF THE PACIFIC OCEAN, ed. by Gordon A. Macdonald and Hisashi Kuno. 1962, 199p. 456 refs. Geophysical Monograph no. 6.

Presented at the tenth Pacific Science Congress, Honolulu, Hawaii, August 21-September 6, 1961.

DESCRIPTORS: *Marine geophysics, *Marine geology, *Pacific Ocean, Geology, Geophysics.

Contents:
Island arcs in the development of the earth's structure (especially in the region of Japan and the Sea of Okhotsk)
Seismic wave velocities in the New Guinea-Solomon Islands region
Ocean-basin evolution by sea-floor spreading
Crustal structure and volcanism in Hawaii
Surface-wave studies of the Pacific crust and mantle
On the relationship between geotectonic and geophysical phenomena of the Kuril-Kamtchatka folding zone at the junction zone of the Asiatic Continent with the Pacific Ocean
Earthquakes and geologic structure of the northwest margin of the Pacific Ocean Basin
On the relationship of deep earthquakes of eastern outlying districts of Asia with large crustal structures
Gravity anomalies and the crust of the earth in the Pacific Basin
A short outline of the geology of Malaya with special reference to Mesozoic orogeny
Extrusive vulcanism with reference to earth movements
Magma type and crustal structure in the Aleutian Arc
Petrochemical features of volcanism in relation to the types of the earth's crust
On the age of the granitic rocks in relation to the structural features of Sumatra
Igneous and structural features of Thailand
Frequency distribution of rock types in oceanic, orogenic, and kratogenic volcanic associations
Crustal deformation and igneous activity in the South Fossa Magna, Japan
Structure and volcanism in the taupo volcanic zone, New Zealand
Basalt magma types and their tectonic associations: Pacific northwest of the United States
A new hypothesis for origin of Guyots and Seamount terraces
A mechanism of formation of oceanic magma
Relationship of petrographic suites in Hawaii.

NAS-NRC-1075
Order from NAS-NRC $2.75

Committee on Nuclear Science, National Research Council, Washington, D. C.
NUCLEAR GEOPHYSICS, ed. by P. M. Hurley. Proceedings of a Conference [no. 5], Woods Hole, Mass. 7-9 June 62. 1963, 252p. 212 refs. Nuclear Science Series rept. no. 38.

DESCRIPTORS: Nuclear physics, *Geophysics, Marine geophysics, Oceanographic data, Geologic age determination, Oceans, Sea Water, Radioactivity, Stable isotopes, Uranium, *Conferences, Massachusetts.

Contents:
Symposium on the earth's interior, geochronology, symposium on oceanic mixing, uranium-series dating, stable isotopes, other topics.

NAS-NRC-1085
Available free from NAS-NRC

Geophysics Research Board, National Research Council, Washington, D. C.
AN OUTLINE OF INTERNATIONAL PROGRAMS IN THE ATMOSPHERIC SCIENCES. Jan 63, 100p. 5 refs.

DESCRIPTORS: *Atmosphere, *Scientific research, Collaboration, *Meteorology, Weather forecasting, Upper atmosphere, Chemistry, Climatology, Education, Hydrology, Oceanology.

Contents:
Major objectives and general recommendations
Research on weather prediction and modification
The high atmosphere
Atmospheric chemistry
Climatology and related area
Education and training
Meteorological services
Relation to hydrology and oceanography.

NAS-NRC-1088
Order from NAS-NRC OTS $1.50

Office of the Foreign Secretary, National Academy of Sciences, Washington, D. C.
INTER-AMERICAN CONFERENCE ON MARINE SCIENCES HELD AT KEY BISCAYNE, FLORIDA, NOVEMBER 8-10, 1962, ed. by Richard C. Vetter and George W. Wood, 1963, 50p. 41 refs. Prepared in cooperation with the Committee on Oceanography.

DESCRIPTORS: *Conferences, *Marine biology, *Oceanography, *South America, *North America, Atlantic ocean, Pacific ocean, Antarctic regions.

Contents:
Area working group reports
Systematics working group report
Naval, scientific, and economic cooperation working group report
General recommendations
Special resolutions and recommendations

Geology

TID-18023 OTS $1.60

Yale U., New Haven, Conn.
FRACTIONATION OF SULFUR ISOTOPES IN LAKE WATERS, by Edward S. Deevey, Jr. and Noboyuki Nakai. Rept. on Contract AT(30-1)2652. Sep 62, 18p. 13 refs.

TID-18032 OTS $1.60

Geochronometric Lab., Yale U., New Haven, Conn.
VARIATIONS IN RADIOCARBON CONCENTRATION IN TREE-RINGS IN NORTH AMERICA DURING THE 18TH AND 19TH CENTURY, by Minze Stuiver. Rept. on Contract AT(30-1)2052. [1962] 13p. 10 refs.

ENGINEERING

PB 163 395 OTS $1.10

Cowles [Foundation] for Research in Economics [Yale U., New Haven, Conn.].
ON THE JOB SHOP SCHEDULING PROBLEM, by Alan S. Manne. Rept. on Contract Nonr-358(01). 8 May 59, 10p. 4 refs. Cowles Foundation discussion paper no. 73; AD-225 472.

DESCRIPTORS: *Scheduling, *Machine shop practice, Industrial production, Job analysis, Performance tests.

The application of discrete linear programming is investigated for typical job shop scheduling problem. The scheduling problem is one that involves both sequencing restrictions and non-interference constraints for individual pieces of equipment. The computational feasibility is being investigated of the approach in the case of large-scale realistic problems. The sequencing problem involves the performance of n tasks being defined as requiring the services of a single machine for an integral number of time units. The scheduling problem consists of drawing up a plane for time-phasing the individual jobs satisfying (1) sequencing requirements, and (2) equipment interference problems. The schedule is drawn up to minimize the make-span, i.e., the elapsed calendar time for the performance of all jobs subject to the constraints upon sequencing and machine interference and also subject to any delivery date requirements on individual items. (DDC abstract)

TID-17740 OTS $1.10

Sandia Corp., Albuquerque, N. Mex.
THE PHANTOM GAGE (A COMBINED PART AND GAGE SPECIFICATION TECHNIQUE) by Edward S. Roth. Rept. on Contract AT(29-1)789. Jan 63, 8p. SCDC-3010.

PB 163 345 OTS $8.10

Soil [Stabilization] Lab., Mass. Inst. of Tech. [Cambridge].
THE BEHAVIOR OF SOILS UNDER DYNAMIC LOADINGS. 1. HYDRAULIC MACHINE FOR DYNAMIC COMPRESSION TESTS, by Robert V. Whitman. Rept. on Contract DA 49-129-ENG-146. Aug 52, 86p. 2 refs. AFSWP-116; ATI-174 589.

DESCRIPTORS: *Engineering geology, *Soil mechanics, Soils, *Loading (Mechanics), *Hydraulic systems, Machines, Design, Effectiveness, Stresses, *Shock tubes, *Compressive properties, *Test equipment, Underground explosions, Blast.

Contents;
Introduction
Design of rapid loading machine
Instrumentation
Performance of hydraulic testing machine
Uniformity of stress in soil samples
Conclusions and recommendations
Dynamic soil testing with M.I.T. shock tube
Description of hydraulic circuits.

PB 163 341 OTS $14.50

Soil [Stabilization] Lab., Mass. Inst. of Tech. [Cambridge].
THE BEHAVIOR OF SOILS UNDER DYNAMIC LOADINGS. 2. INTERIM REPORT ON WAVE PROPAGATION AND STRAIN-RATE EFFECT, by Donald W. Taylor and Robert V. Whitman. Rept. on Contract DA 49-129-eng-227. July 53, declassified 17 Feb 54, 220p. 147 refs. AFSWP-117; AD-28 650.

DESCRIPTORS: *Engineering geology, *Soil mechanics, Soils, Compressive properties, Experimental data, Test equipment, Effectiveness, Design, Clay, Loading (Mechanics), Propagation, Mechanical waves, Underground explosions, Blast.

Data derived from this investigation are expected to be of value toward the solution of various blast-loading problems; 2 important problems are (1) estimation of strength and settlement characteristics of building foundations subjected to large blast loadings and (2) estimation of propagation characteristics of earth shock due to either surface loading or underground explosions. Topics included are the fundamental concepts of compression tests; performance of the rapid-loading machine during very fast tests; unconfined compression tests on Boston clay; vacuum triaxial tests on Ottawa, Fort Peck, and Yucca Flats (AEC) sands; and design of a long triaxial machine for wave-propagation studies. Conclusions concerning strain-rate effects involved the strain-rate effect on compressive strength for cohesive and uncohesive soils and the strain-rate effect upon compressive modulus. (DDC abstract)

PB 163 342 OTS $17.50

Soil [Stabilization] Lab., Mass. Inst. of Tech. [Cambridge].
THE BEHAVIOR OF SOILS UNDER DYNAMIC LOADINGS. 3. FINAL REPORT ON LABORATORY STUDIES, by R. V. Whitman, J. F. Cheatham and others. Rept. on Contract DA 49-129-eng-227. Aug 54, 271p. 71 refs. AFSWP-118; AD-64 032.

DESCRIPTORS: *Engineering geology, *Soil mechanics, *Soils, Compressive properties, Loading (Mechanics), Clay, Silt, Sand, Moisture, Stresses, Propagation, Mechanical waves, Creep, Relaxation time, Supports, Tests, Underground explosions, Blast.

Contents:
Background for strain-rate effect tests
Additional strain-rate effect tests on cohesive soils
Strain-rate effect tests on slightly moist sand
Dynamic loading tests on saturated sands
Review of strain-rate effect tests
Background for wave propagation studies
General discussion of stress-strain relations
Creep, relaxation and stress-strain-time behavior
Review of theoretical wave propagation solutions
Instrumentation for wave propagation studies
Results of wave propagation tests upon sands
Review of stress-strain and wave propagation studies
Background for footing motion studies
Laboratory tests on model footings
Analytic study of footing motion under vertical dynamic loads
Review of footing motion studies
Equations for behavior within dynamic permeameter
One-dimensional compression tests
Properties of coral sand from Eniwetok Island

PB 163 343 OTS $6.60

Soil [Stabilization] Lab., Mass. Inst. of Tech. [Cambridge].
THE BEHAVIOR OF SOILS UNDER DYNAMIC LOADINGS. 4. REVIEW AND PRELIMINARY CORRELATION OF LABORATORY AND FIELD STUDIES, by R. V. Whitman. Rept. on Contract DA 49-129-eng-227 June 55, declassified 20 June 63. 63p. 15 refs. AFSWP-119; AD-76 094.

DESCRIPTORS: *Engineering geology, *Soil mechanics, Soils, Reviews, Experimental data, Test equipment, Cratering, Transients, Correlation techniques, Underground explosions, Blast.

Contents:
Studies at M.I.T.
Discussion of field instrumentation
Cratering and permanent displacements
Transient phenomenology
Conclusions and recommendations

Aeronautical Engineering

PB 163 337 OTS $16.00

Armour Research Foundation, Chicago, Ill.
STUDY AND DESIGN OF A PULSE SYSTEM OF STRAIN RECORDING, by P. L. Toback. Final rept. on design phase, Contract AF 33(038)21252. Feb 54, 243p. 9 refs. Proj. no. E018-8; AD-61 533.

DESCRIPTORS: *Propellers (Aerial), Stresses, Measurement, *Strain guages, *Measuring devices (Electrical and electronic), Electromagnetic pulses, *Recording systems, Airborne, Design, *Pulse generators, Electric bridges, Amplifiers, Power supplies, Circuits.

Following the Study and Field Test Phases of this project, during which the feasibility of a pulse modulation system of strain measurement in aircraft propellers was examined, a Design Phase was undertaken to provide a complete electrical and mechanical design of a 24-channel airborne unit. Specific attention was directed at redesigning certain electrical components, including the bridge output transformers, to eliminate the need for extra components on the propeller; the excitation amplifier output transformers, to eliminate the "resetting" winding and to provide a "balancing" winding; and the channel amplifier, to provide increased power to drive the specified galvanometers. In addition, the design of the required power supplies and calibration unit was included. The drawings, schematics, and layouts for the individual units as well as the overall configuration of the system are included. The 24-channel unit is composed of eight individual units, each of such a size and weight that it may easily be handled by no more than two men. The units are designed so that they may either be stacked or placed in separate locations to permit flexibility of operation in the aircraft. Shock mounts are provided for protection against excessive vibration. A complete electronic parts list and mechanical bill of materials are also included. (Author)

NASA N63-17221 OTS $2.60

Battelle Memorial Inst., Columbus, Ohio.
EXPLORATORY STUDIES OF MECHANICAL CYCLING FATIGUE BEHAVIOR OF MATERIALS FOR THE SUPERSONIC TRANSPORT, by D. N. Gideon, C. W. Marschall, and others. Quarterly progress rept. no. 3, 1 Jan-15 Apr 63, on NASA Contract NASr-100(01). 15 Apr 63, 25p. 5 refs. NASA CR-50365.

AD-281 798 OTS $5.60

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
NEW METHODS FOR UNDERSTANDING AND CONTROLLING VIBRATIONS OF COMPLEX STRUCTURES, by Manfred A. Heckl, Richard H. Lyon and others. Rept. on Dynamic Problems in Flight Vehicles, Contract AF 33(616)7973. June 62, 58p. 21 refs. Rept. no. 875; ASD TN-61-122; NASA N62-14588.

DESCRIPTORS: *Airframes, *Structures, *Vibration, Test methods, Damping, Acoustics, Vibration isolators, Elasticity, Beams, Sheets, Dynamics, Mathematical analysis, Theory, Energy, Absorption, Airplane panels, Spaceships, Metal plates, Viscosity, Aircraft.

New methods are outlined for dealing with the vibration responses of complex flight vehicle structure to local and to diffuse acoustic excitation. Energy absorption at structural joints and acoustic radiation resistance are shown to be important in establishing levels of these responses. Some experimental results pertaining to energy absorption coefficients and radiation resistance are given, and procedures for estimating the latter are discussed. Feasibility studies of vibration absorbers utilizing viscoelastic spring elements and distributed mass systems and of vibration isolators composed of viscoelastic leaf springs are summarized. Only the latter are found to possess some practical advantages over conventional systems. An analytical investigation is summarized, which shows that generally damping of only the plates of beam-plate systems may be more desirable than damping of only the beams. (Author)

PB 163 391 OTS $15.00

General Kinetics, Inc., Arlington, Va.
LOGICAL DESIGN AND DIGITAL COMPUTER PROGRAM FOR A TERMINAL AIR TRAFFIC CONTROL CENTRAL, by Walter L. Anderson, Kenneth C. Ballard and others. Final rept., 15 Feb 57-14 Feb 58, on Contract AF 19(604)2241. [1958] 225p. 13 refs. AFCRC-TR-58-160; AD-152 445.

DESCRIPTORS: *Air traffic control systems, *Terminal flight facilities, *Digital computers, *Programming (Computers), Design.

A complete logical plan was developed for terminal equipment which will connect the analog trackers and operators' consoles of the AN/GSN-3 (XD-1) Air Traffic Control Central (Volscan) to a commercially available digital computer. This arrangement will perform in real time and by digital methods all computations performed by analog methods by the scheduling units and computers, and will also provide the inter-console signalling functions of the AN/GSN-3. The terminal equipment is reasonable as to size and complexity. It uses solid state components to assure maximum reliability. Three input units are required: one for radar data; one for aircraft flight data; and one for scheduling data. Two output units furnish commands to the aircraft and schedule data. A complete mathematical analysis was made of the flight path and scheduling calculations including static and dynamic errors. A program for performing in real time these calculations and executing the inter-console signalling functions was written and tested on an available computer, the IBM-704. Two commercially available digital computers, the Sperry Rand UNIVAC Scientific 1103A and the International Business Machines Corporation Type 704, are capable of meeting the performance requirements. The program is suitable for either. Results of real time computer tests indicate that all computations and scheduling can be performed in 80 msec or less per aircraft under control. (Author)

PB 163 336 OTS $3.60

[IIT Research Inst.] Chicago, Ill.
STUDY AND DESIGN OF A PULSE SYSTEM OF STRAIN RECORDING, by P. L. Toback and D. C. Maxwell. Final rept. on Study Phase Extension, Contract AF 33(038) 21252. 18 Sep 52, 31p. 4 refs. Proj. no. 90-999E; AD-61 531.

DESCRIPTORS: *Propellers (Aerial), Stresses, Measurement, *Strain gages, Electromagnetic pulses, *Recording systems, Airborne, Design, Noise(Radio), *Pulse generators, Amplifiers, Sensitivity, Stability, Attenuators, Pulse transformers, Circuits.

By modifying the pulse generator system and by redesigning the bridge output transformers, cross-talk between channels was reduced by more than 50%. The incorporation of a clipper-limiter circuit to stabilize the amplitude of the excitation pulses resulted in an appreciable increase in overall system stability. Two sensitivity controls were added to increase the flexibility of the system. One, a two-step attenuator, was incorporated in the power amplifier to permit the reduction of bridge excitation voltage when required. The second consisted of a nine-step semi-logarithmic gain control in the detectors to permit the selection of the proper gain in each channel. The channel amplifiers were completely redesigned and tested in breadboard form. This new design, which utilizes only 2 tube envelopes in place of the original 5, will reduce by 18 the number of tubes required in the proposed 24 channel system. (Author)

NASA N63-18235 OTS $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN ANALYSIS OF VG AND VGH OPERATIONAL DATA FROM A TWIN-ENGINE TURBOPROP TRANSPORT AIRPLANE, by Paul A. Hunter and Walter G. Walker. July 63, 48p. 10 refs. NASA TN-D-1925.

NASA N63-18134 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
RANDOM DEVIATIONS FROM STABILIZED CRUISE ALTITUDE OF COMMERCIAL TRANSPORTS AT ALTITUDES UP TO 40,000 FEET WITH AUTOPILOT IN ALTITUDE HOLD, by Joseph J. Kolnick and Barbara S. Bentley. July 63, 38p. 3 refs. NASA TN D-1950.

PB 163 398 Available on loan from OTS

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF THE EFFECTS OF AIR TRAFFIC OPERATING AT SEVERAL PROPOSED JETPORTS UPON THE AIR TRAFFIC CONTROL SYSTEM, by H. Slattery, D. Bottomley and others. Final rept. May 63, 181p. Proj. no. 101-134-00V.

DESCRIPTORS: *Airports, *Air traffic, *Air traffic control systems, Analysis.

A new jetport had been proposed to serve the New York metropolitan area, to be operational by 1968. A study was made of the effects of this proposed jetport on the Air Traffic Control System, using the Model B Dynamic Simulator for air traffic control studies, and also using automatic data processing facilities for a traffic flow pattern analysis. Three proposed sites were submitted for evaluation and were located in Orange County, New York, Suffolk County, New York, and Burlington County, New Jersey. The results of the simulation indicated that the air traffic control problems generated by any of the three jetport sites would be complex and would generally arise due to crossings of heavily used arrival and departure routes with those of the other major airports in the area. The airspace requirements for handling the traffic flows for any of the three sites would necessitate changes to the boundaries of established warning and restricted areas, or jurisdiction of airspace of other control facilities. The traffic flow pattern analysis indicated there would be no overall appreciable differences in the demand upon the system by air traffic under the various site conditions. (Author)

PB 163 352 OTS $8.60

Republic Aviation Corp., Farmingdale, N. Y. MAINTAINABILITY AND SUPPORTABILITY EVALUATION TECHNIQUE, by J. E. Losee and J. A. Buongiorno. Summary rept. on Phase 1, Contract AF 33(616)6495. Mar 60, 92p. WADD TN 60-82, Part I; AD-245 130.

DESCRIPTORS: *Jet fighters, Fighters, Jet planes, *Maintenance, Design, Specifications, Military requirements, Mathematical analysis, Reliability, Military procurement, *Operations research.

Research is concerned with the following: (a) Defining maintainability of a weapon system, (b) Determination and inclusion of quantitative maintainability requirements in specifications, (c) Contractor compliance with maintainability specification and, (d) Procuring agency measurement of the maintainability achieved by the contractor. While evaluating the maintainability and support characteristics of a system, it is advisable that an orderly sequence of such events be followed. In this report an attempt is made to present such a procedure. A functional flow chart is presented which indicates the order of activity and interactions of various agencies and groups, beginning initially with intelligence information and/or state-of-the-art knowledge, through application of maintainability evaluation techniques and ultimately to the final appraisal by the purchasing agency specification applications group. It is believed that the review of system proposals submitted on a competitive basis will be facilitated when such an orderly and standard format is followed by all participating agencies. (Author)

PB 163 353 OTS $15.50

Republic Aviation Corp., Farmingdale, N. Y. MAINTAINABILITY AND SUPPORTABILITY EVALUATION TECHNIQUE. PART II. APPLICATION OF THE MAINTAINABILITY AND SUPPORTABILITY FORMULAE TO CONTRACTOR SELECTED PORTIONS OF A REPRESENTATIVE SYSTEM REQUIREMENT OR DEVELOPMENT DESIGN AREA TO DETERMINE ADEQUACY, by J. E. Losee, J. A. Buongiorno, and W. F. Frahm. Summary rept. on Phase II, Contract AF 33(616)6495. May 60, 234p. 22 refs. WADD TN 60-82, Part II; AD-249 390.

DESCRIPTORS: *Target drones. *Hydraulic systems, *Maintenance, Design, Military requirements, Mathematical analysis, Reliability, *Operations research, Specifications, Costs, Analysis, Management engineering, Time, Aircraft, Guided missiles, Maintenance equipment.
Techniques and methods are proposed to quantify maintainability and enable the maintenance and support effectiveness of any product to be determined in its early design stage. A brief summary is included which indicates the type of information being collected and its orderly flow to give time and resource summations. An actual maintainability and support evaluation has been made of a particular hydraulic system as it might be incorporated in a drone aircraft. The time and resource elements and the rate-of-work are based upon an operational concept period of 120 days with ten drones flying approximately 1.5 hours each per day, or 180 hours per period per drone. (Author)

PB 163 354 OTS $13.50

Republic Aviation Corp., Farmingdale, N. Y. MAINTAINABILITY AND SUPPORTABILITY EVALUATION TECHNIQUE. PART III. VOLUME I APPLICATION OF THE MAINTAINABILITY AND SUPPORTABILITY FORMULAE TO A USAF SELECTED PRODUCT TO ENABLE USAF EVALUATION OF FORMULAE EFFECTIVENESS, by J. E. Losee, J. A. Buongiorno and others. Rept. on Phase 3, Contract AF 33(616)6495. June 60, 192p. 24 refs. WADD TN 60-82, Part III, Vol. I; AD-249 391.

DESCRIPTORS: *Generators, Maintenance, Military requirements, Specifications, *Operations research, Costs, Analysis, Time, Management engineering, Aircraft, Guided missiles, Effectiveness, *Test facilities, Electronic equipment, Navigation, Identification systems, Communication systems, Jet fighters, Jet planes.

A maintainability management technique was developed to indicate how a quantitative maintainability program can be implemented. In addition, the evaluating formulae and techniques developed are applied to a generator set as it might be used under continuous austere base conditions in the Republic designed radiating test facility (RADFAC). The generator set was chosen as an illustrative example because of USAF in-service experience with similar sets installed in tanker and logistical support aircraft. Some degree of cross-check and technique validation should thus be possible by interested USAF agencies. (Author)

PB 163 355 OTS $9.10

Republic Aviation Corp., Farmingdale, N. Y. MAINTAINABILITY AND SUPPORTABILITY EVALUATION TECHNIQUE. PART III. VOLUME II. APPLICATION OF THE MAINTAINABILITY AND SUPPORTABILITY FORMULAE TO A USAF SELECTED PRODUCT TO ENABLE USAF EVALUATION OF FORMULAE EFFECTIVENESS, by J. E. Losee, J. A. Buongiorno and others. Rept. on Phase 3, Contract AF 33(616)6495. June 60, 101p. WADD TN 60-82, Part 2, Vol. 2; AD-249 089.

DESCRIPTORS: *Maintenance, *Generators, Specifications, Military requirements, Costs, Maintenance personnel, *Operations research, Military procurement Job analysis, Management engineering, Mathematical analysis, Reliability.

The maintainability management technique was developed to indicate how a quantitative maintainability program can be implemented. In addition, the evaluating formulae and techniques developed in all three phases are applied to a Generator Set as it might be used under continuous austere base conditions in the Republic designed Radiating Test Facility (RADFAC). The Generator Set was chosen as an illustrative example because of USAF in-service experience with similar sets installed in tanker and logistical support aircraft. Some degree of cross-check and technique validation should thus be possible by interested USAF agencies. (Author)

Chemical Engineering

MCW-1478 OTS $2.50

Mallinckrodt Chemical Works, Weldon Spring, Mo.
THE INTEGRATED FLUID-BED SYSTEM, by S. Simecek and W. T. Trask. Topical Rept. on Contract W14-108-eng-8. 10 June 63, 126p. 11 refs.

NAS-NRC-942
Order from NAS-NRC OTS $6.00

National Research Council, Washington, D. C.
PROCEEDINGS OF THE CONFERENCE ON DESALINATION RESEARCH [NO. 2] ORGANIZED AND CONVENED AT WOODS HOLE, MASSACHUSETTS 19 JUNE-14 JULY 1961, SPONSORED BY THE OFFICE OF SALINE WATER, DEPARTMENT OF THE INTERIOR AND THE NATIONAL SCIENCE FOUNDATION. 1963, 460p. 441 refs.

DESCRIPTORS: *Conferences, *Desalination, *Water, *Sea water, Economics, Physical chemistry, Transport properties, Biology, Industrial research, Massachusetts.

Contents:
The water problem
Government activities
Structures of materials and chemical physics
Transport phenomena: theory and application
Biological research
Industrial symposium on conversion processes
Some approaches other than desalination

IDO-14304 OTS $2.60

Phillips Petroleum Co., Idaho Falls.
PILOT PLANT STUDIES OF CONTINUOUS NITRIC ACID DISSOLUTION OF URANIUM-ALUMINUM ALLOY, by D. M. Paige, A. F. Boeglin and others. Rept. on Contract AT(10-1)205. 30 May 54, declassified 21 May 62, 28p. 4 refs.

Civil Engineering

NAS-NRC-1076
Order from NAS-NRC $2.50

Building Research Advisory Board, National Research Council, Washington, D. C.
CRITERIA FOR HYDRAULIC FILLS, by George F. Sowers. Rept. on FHA Contract HA (--) fh-743. 1962, 47p. 10 refs. Rept. no. 25.

DESCRIPTORS: *Soil mechanics, *Civil engineering, Underwater, Soils, Rock (Geology), Mechanical properties, *Hydraulic research.

This study was limited to fills placed as hydraulically-discharged materials, and fills placed below water level. Only soil material placed through a water medium has been considered to constitute "hydraulic fill"; this includes dredged material which is pumped through pipelines, and material bottom-dumped from barges. Excluded are dredged materials which are stockpiled for later placement and compaction by means of mechanical equipment such as bulldozers, rollers, and tampers.

NAS-NRC-1077
Order from NAS-NRC $3.00

Building Research Advisory Board, National Research Council, Washington, D. C.
DESIGN CRITERIA FOR RESIDENTIAL SLABS-ON-GROUND, by M. M. Lemcoe. Final rept. on Contract HA (——) fh-743. 1963, 105p. 11 refs. Rept. no. 17R.

DESCRIPTORS: Foundations (Structures), *Concrete, *Housing, Design, Specifications, Civil engineering, Soil mechanics, Reinforcing materials.

This study deals only with slab-on-ground construction for light residential structures. It provides recommendations which it is believed will assure sound residential slabs by defining the conditions and appropriate limitations in accordance with the variables encountered. Considerations involved are the maximum dimension to which a heated or unheated slab may be constructed without reinforcement, and without the prospect of harmful cracking due to shrinkage and temperature change; the amounts of reinforcement required for slabs of greater length; the structural requirements of slabs which are to be placed on expansive or compressible soil; and, last, the research needed to fill remaining gaps in knowledge concerning the effect of various factors on residential-slab performance.

NAS-NRC-1037
Order from NAS-NRC $2.00

Building Research Advisory Board, National Research Council, Washington, D. C.
MAXIMUM CONTINUOUS TEMPERATURES FOR VAPOR BARRIERS, by Frank A. Joy. Rept. on FHA Contract HA (---) fh-743. 1962, 28p. 5 refs. Rept. no. 15b.

DESCRIPTORS: *Moistureproofing, *Foundations (Structures), *Housing, Vapors, Temperature, Degradation, Bituminous coatings, Plastic coatings, Sheets, Heaters, Furnaces, Concrete, *High temperature research.

The purpose of this study was to determine whether vapor barriers as conventionally employed in residential slab-on-ground construction, may be subject to exposure for extended periods to temperature levels which could reduce their effectiveness as barriers; and to provide guidance with respect to tolerable temperature-exposure levels for the various available vapor-barrier materials.

NAA-SR-7455 OTS $2.50

Atomics International, Canoga Park, Calif.
THEORY, DESIGN, AND PERFORMANCE OF HELICAL-ROTOR, ELECTROMAGNETIC PUMP, by R. S. Baker. Rept. on Contract AT(11-1)GEN-8. 31 May 63, 121p. 24 refs. NASA N63-17245.

PB 163 333 OTS $5.60

General Atronics Corp., Bala-Cynwyd, Pa.
THE THEORY OF PULSED SIGNAL MEASUREMENTS, by Glenn W. Preston. Final rept. on Enhanced Accuracy Pulses Study, Contract AF 30(602)2120 20 Aug 60, 56p. 11 refs. Rept. no. 779-207-12; RADC TR-60-207; AD-248 632.

DESCRIPTORS: Coding, *Electrical networks, Errors, Measurement, *Radar pulses, *Radar, Theory, Video signals, Sonar, Pulse communication systems, Space navigation.

The fundamental theory of radar measurements has been extended and a general procedure has been evolved for determining the design of electrical measuring networks which give approximately optimum estimates of various target parameters. This procedure has been applied to the measurements of target velocity, target acceleration, target multiplicity (the measurement of the number of targets present at approximately the same range but having different velocities and cross-sections) and target spin. The measuring networks in these cases consist of a set of parallel filters at IF--the first member of which is the familiar matched filter. This matched filter set is followed by balanced mixers and static real time noniterative video arithmetic matrix operations. An interesting possibility is noted for using the pulse meas uring network to compensate those variations in the transmitter pulse form which would otherwise affect the measurements of the target parameters, thus relieving the stability requirements on the transmitter. (Author)

PB 163 349 OTS $3.60

General Dynamics Astronautics, San Diego, Calif.
A SECOND STATISTICAL METHOD FOR ANALYZING THE PERFORMANCE VARIATION OF ELECTRONIC CIRCUITS, by Ralph H. Hinrichs. Rept. on Contract AF 04(645)4. 15 Feb 56, 36p. 5 refs. Rept. no. ZX-7-010; WDD Document no. 56-2742; AD-218 757.

DESCRIPTORS: *Electronic circuits, Design, *Reliability (Electronics), *Statistical analysis, *Probability, Special functions, *Taylor's series.

Efforts were made to evaluate the reliability of a proposed electronic design. The probability density function of any circuit performance function must be found from parts data. This should be done analytically, because experimental methods are too time-consuming and uneconomical in the design phase. An analytical method is described for accomplishing the above. The method uses a second-order Taylor's Series in place of the actual circuit performance function, and employs statistical moments. The method has so far been applied to the steady-state performance of simple, linear circuits, However, this method is sufficiently general that it should be applicable to any problem in which the function of interest can be approximated with sufficient accuracy by a Taylor's Series. Therefore, it should be applicable to nonlinear circuit functions which can be expressed algebraically, to certain characteristics of transient response such as resonant frequencies and damping factors, and to problems in other branches of engineering. This method should also be applicable to components and systems. It is recommended that the method be adopted for general use in the reliability evaluation of proposed WS-107A designs. (Author)

AD-265 170 OTS $6.60

Gulton Industries, Inc., Metuchen, N. J.
INVESTIGATIONS LEADING TO IMPROVED SEALED NICKEL-CADMIUM BATTERIES, by H. N. Seiger. Quarterly progress rept. no. 4, 1 Apr-30 June 61, on Contract AF 36-039-sc-85390. [1961] 63p. 9 refs.

DESCRIPTORS: *Batteries and components, *Alkaline cells, *Seals (Stoppers), Ceramic materials, Metal seals, Soldering alloys, *Battery separators, Design, Manufacturing methods, *Electrodes, Anodes (Electrolytic cell), Nickel, Cadmium

Ceramic-to-metal seals are being made using a batch process using two furnaces. Plate formation in the pilot plant has been made automatic. Additional methods of making the cover to can closure are being investigated. Separator tests on polypropylene from American Felt and Pellon's PVC and polypropylene at 125°F and -40° F were completed. The separators which seemed most promising were tested for strength and resistance after storage in electrolyte at 165°F. New cells were fabricated to improve uniformity between cells. Pressure and voltage characteristics were determined. Additional experiments on the oxidation of cadmium were made. The oxygen evolved from barium doped nickel oxide electrodes observed during this quarter is in agreement with data from the previous quarter. In effect, the reactions involved in the early discharges are consecutive reactions. A lithium doped electrode was also run, but observations are being deferred until additional data are obtained. Methods of analyzing oxygen at low concentrations are being investigated.

AD-406 134 repriced $2.50

Gulton Industries, Inc., Metuchen, N. J.
STATE OF CHARGE INDICATORS FOR NICKEL CADMIUM BATTERIES, by M. Lurie, H. N. Seiger, and R. C. Shair. Final rept., Jan 62-Jan 63, on Contract AF 33(657)8130. Feb 63, 105p. 5 refs. ASD-TDR-63-191, NASA N63-16742.

DESCRIPTORS: *Alkaline cells, Electric discharges, Phase meters, Nickel, Cadmium, Electrical properties, *Batteries and components.

The variations of several electrical properties of nickel cadmium cells with state of charge were studied to determine the suitability of any of these for measuring state of charge. Three methods were originally proposed: measurements of ohmic resistance, microsecond transients and double layer capacitance. During the investigations two additional parameters were measured, a. c. impeuance and pnase shift. Double layer capacitance and a. C. impedance and transient behavior are not useful properties for determining state of charge. A phase shift system is described which when properly calibrated predicted state of charge with an average deviation of ± 10%. Ohmic resistance measured under correct conditions showed a closer correlation to state of charge but is difficult to measure. (Author)

AD-265 376 OTS $11.00

[IIT Research Inst.] Chicago, Ill.
THERMOCHEMICAL AND THERMODYNAMIC DATA ON SELECTED COMPOUNDS FOR THE CHEMICAL CONVERSION OF WASTE HEAT TO ELECTRICAL ENERGY, by Richard H. Snow. Phase rept. on Contract NOw 60-0760-c. 16 Aug 61, 145p. 13 refs. Rept. no. ARF 3182-5.

DESCRIPTORS: *Energy conversion, Batteries and components, *Thermal batteries, *Thermochemistry, *Thermodynamics, Heat of formation, Transition temperature, Antimony compounds, Bismuth compounds, Chromium compounds, Copper compounds, Gallium compounds, Germanium compounds, Indium compounds, Iron compounds, Lead compounds, Mercury compounds, Vanadium compounds, Uranium compounds, Silicon compounds, Tungsten compounds, Tin compounds, Tellurium compounds, Phosphorus compounds, Manganese compounds, Thallium compounds, *Oxides, *Halides, Tables.

Thermochemical data for 58 families of compounds are newly compiled. Included are halides and a few oxide families of metals which can exist in more than one valence state. Heats of formation, heats of transition, transition temperatures, coefficients of heat capacity equations, and coefficients of integrated heat of formation and free energy of formation equations are tabulated. Computer-produced graphs give free energy of formation from 298 to 1500°K or higher. The main contribution of this work is a revision of estimates by Brewer and Glassner of thermodynamic properties for which experimental data are not available. Such revisions are based on new experimental values of related properties. Also included are calculated temperatures at which run-down products of galvanic cells can be thermally regenerated. (Author)

PB 163 369 OTS $6.60

Linfield Research Inst., McMinnville, Oreg.
RESEARCH ON HIGH-POWER FIELD EMISSION CATHODES, by F. M. Carbonnier, E. E. Martin, and H. W. Pitman. Quarterly rept. no. 1, 15 June 60-15 Sep 60, on Contracts DA 36-039-sc-85368 and AF 30(602)2157. [1960] 66p. 11 refs. ARPA Order no. 123-60; AD-246 749.

DESCRIPTORS: *Cathodes (Electron tubes), *Field emission, Electron beams, Focusing, Tungsten compounds, Oxides, Tungsten, Zirconium, Electrodes, Electrolytic polishing, Magnetic fields, Design, Electron optics.

Study of the anodic oxidation of tungsten has been extended to current densities of the order of 100 ma/sq cm using the constant current coulometric method. Data obtained at 30°C and 50°C have allowed for the first time a qualitative assessment of the degree to which the oxidation conforms to the predictions of the Mott-Cabrera theory concerning variation of Tafel slope and forming field with temperature. Conditions for mechanical stability of linear array type field emission cathodes operated in conjunction with closely spaced grid structures are considered. The use of magnetic lenses to refocus field emission beams or produce axially collimated beams is discussed. Properties of pure metal cathodes, cathodes from homogeneous metal compounds and heterogeneous cathodes consisting of a thin layer of low work function material on needle-shaped metal substrates are discussed, and a preliminary comparison of the operation of a zirconium coated tungsten tip with that of a pure tungsten needle is discussed.

PB 163 370 OTS $5.60

Linfield Research Inst., McMinnville, Ore.
RESEARCH ON HIGH-POWER FIELD EMISSION CATHODES, by F. M. Charbonnier, E. E. Martin and others. Quarterly rept. no. 2, 15 Sep-15 Dec 60, on Contracts DA 36-039-sc-85368 and AF 30(602)2157. [1960] 57p. 7 refs. ARPA Order no. 123-60; AD-252 564.

DESCRIPTORS: Field emission, Design, Theory, *Cathodes (Electron tubes), Electron beams, Tungsten compounds, Manufacturing methods, Electronic switches), Carbides, Processing, Zuconium compounds, Hafnium compounds, Oxides, *Electrodes, *Electron tubes, Vapor plating, Electron optics, Molybdenum alloys, Tungsten, Zeconium alloys, Switching circuits.

The feasibility of utilizing field emission cathodes in high vacuum switch tubes for high power pulsed application is being studied. Repetitive film formation and dissolution as a micromachining procedure for uniform removal of tungsten from field emission tips was demonstrated. Methods of analysis of field emission data are formalized. Large numbers of sharp tungsten projections, which may be potentially useful as field emitters, were produced by vapor deposition. Progress toward construction of a simple tube for testing short lens magnetic focusing of a field emitted beam is discussed. The fabrication and testing of field emitters of ZrC, HfC and Mo-Zr alloy are discussed; the emission current-voltage response of needles of these three materials and corresponding emission patterns are presented. The performance of four tubes of the third field emission switch tube design is discussed. Emission of a 7 amp peak current at an applied voltage of 15.4 kv represents significant improvement in beam conductance and perveance over those measured in earlier tubes. (Author) (See also PB 163369)

NASA N63-17228 OTS $3.60

Minneapolis-Honeywell Regulator Co., Minn.
ADAPTIVE STATE VECTOR CONTROL. SECTION 4: THE THEORY OF TIME-OPTIMAL CONTROL OF LINEAR SYSTEMS, by C. A. Harvey and E. B. Lee. Rept. on NASA Contract NASr-27. 15 Apr 62, 36p. 14 refs. MH-MPG-1529-TR4; NASA CR-50324.

NAS-NRC-1080
Order from NAS-NRC $5.00

National Research Council. Div. of Engineering and Industrial Research, Washington, D. C.
CONFERENCE ON ELECTRICAL INSULATION [NO. 31] AT THE HERSHEY HOTEL, HERSHEY, PENNSYLVANIA ON OCTOBER 15-17, 1962. 1962 Annual rept. Jan 63, 118p. 53 refs.

DESCRIPTORS: *Electric insulation, *Mineral oils, *Acetates, Liquids, Dielectric properties, Polarization, *Dielectrics, *Plastics, Carbon black, *Polyethylene plastics, Cryogenics, *Polyester plastics, *Thermoplastics, Dielectric films, *Aluminum compounds, Oxides, Polymers, Capacitors, *Glow discharges, Ionization, *Gas ionization, Air, *Electric currents, Additives, Glass, Electric discharges, Electric potential, Pressure, Oils.

Contents:
Correlation between the energetic parameters determining the viscous flow of mineral oils and their molecular structure; The viscoelectric effect in n-Amyl acetate; The dielectric properties of liquids under a small dc bias; Ionic polarization in liquid dielectrics; Measurement of cure in casting resins by means of electrical properties; Parameters affecting the increase in dielectric loss due to carbon black paper screens for oil-paper dielectrics--II; Monitoring dielectric materials for use in microwave components; Characteristics of polyethylene under voltage; Electrical insulation for application at cryogenic temperatures; The structure and electrical properties of poly(1,4-cyclohexylene-dimethylene terephthalate), a new linear thermoplastic polyester; Formation of dielectric films by ultraviolet photolysis of several organic monomers; The dielectric properties of sintered aluminum oxide in the intermediate temperature range; Long-time effects of humidity change on the dielectric properties of certain polymers; Aromatic imide polymers for electrical insulation; Application of the eyring model to capacitor aging data; Precise measurement of dielectric constant by the two-fluid technique; A versatile corona detector; Photoionization and breakdown; Some studies of gaseous breakdown; A preliminary study of the factors which influence the sparkover of insulators in dry air and with dry air SF_6 mixtures; Electric breakdown of SF_6 at high pressures up to the liquid state; Additives for the self-extinguishment of corona in gases; Discontinuous electrical discharges from charged glass samples; Some observations of corona starting voltages on unsymmetrical dielectric assemblies; A study of conductor edge corona on insulation surfaces under high temperature, variable gas pressure and ionizing radiation conditions; Recent studies of treeing breakdown; Breakdown statistics of sphere-to-plane gaps in transformer oil; and Methods for eliminating AC corona in polymeric film capacitors

PB 163 330 OTS $5.60

Radio Corp. of America, Somerville, N. J.
70 MC, 1 WATT SILICON TRANSISTOR, by F. L. Katnack. Quarterly rept. no. 5, 5 June-5 Sep 60, on Industrial Preparedness Measure, Contract DA 36-039-sc-81285. [1960] 54p. AD-247 608.

DESCRIPTORS: *Transistors, Silicon, Very high frequency, Manufacturing methods, Production, Life expectancy, Tests, Diffusion, Specifications, Reliability.

An entire device run made by the proposed manufacturing process was electrically measured and distributions of these measurements were plotted. After comparing the contract objective electrical specifications to these distributions, recommendations were made for improving device yields. A revised Group A inspection is presented in this report. A group of 100 transistors (those passing the revised Group A inspection) from these distributions were submitted to Group B testing. Both Group A data and the end point measurements on each Group B test are presented. The evidence indicates that the present design is good mechanically but is marginal on environment testing. Life test data show the breakdown voltages to be stable on 200°C storage; but there was a continual increase in I_{CBO}. The Group B failures are discussed and recommendations made for preventing their occurrence. (Author)

PB 163 331 OTS $3.60

Radio Corp., of America, Somerville, N. J.
70 MC, 1 WATT SILICON TRANSISTOR, by F. L. Katnack. Quarterly rept. no. 6, 5 Sep-5 Dec 60, on Industrial Preparedness Measure, Contract DA 36-039-sc-81285. [1960] 38p. AD-253 076.

DESCRIPTORS: Silicone resins, Silicon coatings, Dioxides, *Transistors, Manufacturing methods, Production, Test methods, Design, Very high frequency, *Transistor amplifiers, Radiofrequency amplifiers, Amplifiers, *Oscillators, Radiofrequency oscillators, Silicon, Life expectancy, Tests, Surface properties, Processing, Test sets.

The Group B 200° C storage lifetest performance of the preproduction samples is reviewed. Based on these data a modified post bond treatment is presented. Data are given on a second group of preproduction samples made with this revised process. The progress on surface stabilization is described. Storage lifetest data are given on both mesa transistors coated with a silicone resin, and planar transistors coated with silicon dioxide. A circuit for the measurement of 70 mc common emitter current gain is described. Correlation measurements between the previously used transfer function bridge and the new set are given. A mounting clamp which will be supplied with this transistor to facilitate mounting and heat sinking of the device is also described. (Author) (See also PB 163330)

TID-17749 OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
ELECTRICAL NOISE IN INSTRUMENTATION SYSTEMS, by H. D. Arlowe. Rept. on Contract AT(29-1)-789. Dec 62, 15p. SCDC-2727.

NASA N63-17504 OTS $2.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
SOME CONTROL PROBLEMS ASSOCIATED WITH EARTH-ORIENTED SATELLITES, by Vernon K. Merrick. June 63, 81p. 3 refs. NASA TN D-1771.

PB 163 399 OTS $2.60

Bureau of [Naval Weapons] Washington, D. C.
TABLE OF MILITARY HIGH EXPLOSIVES (SECOND REVISION), by Philip C. Keenan and Dorothy Pipes. 26 July 46, declassified, 23p. NAVORD rept. 87-46.

DESCRIPTORS: *Explosive materials, Tables, Chemical properties, Physical properties, Ordnance.

PB 163 396 OTS $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DEVELOPMENT OF A POLYETHYLENE CONTAINER FOR PROPELLANT POWDER, by Mario E. Gigliotti and James M. Spilman. Oct 58, 17p. Technical rept. 2548; AD-204 757.

DESCRIPTORS: *Explosive materials, Powders, *Propellants, Storage, *Containers, *Polyethylene plastics, Tests

When it was found not feasible to develop a plastic liner for use with wooden boxes for propellant powder, a design of a 50-pound-capacity polyethylene container was developed. Prototype containers were procured and evaluated by means of physical, detonation, and chemical tests. The test showed the following: (1) the polyethylene container - in four of the 18 specimens tested - leaked after rough handling, showing the necessity for reevaluation of its closure design, and punctured when dropped on a protruding object such as a nail head; (2) when ignited by a squib, the powder in the polyethylene container burned rather than detonated high-order, thus resulting in an ICC classification as a class B explosive; (3) there was no significant change in chemical composition or ballistic performance of the propellant powders stored in polyethylene containers as compared with storage in the standard metal container. (Author)

NASA N63-17547 OTS $0.75

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ON THE MOTION OF A 24-HOUR SATELLITE, by Peter Musen and Ann E. Bailie. June 63, 23p. 5 refs. NASA TN-D-1750.

NASA N63-18210 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FLIGHT TEST OF A PITCH CONTROL FOR A SPINNING VEHICLE, by H. D. Garner and H. J. E. Reid, Jr. July 63, 14p. refs. NASA TN-D-1922.

AD-284 547 OTS $26.00

Lockheed Missiles and Space Co., Sunnyvale, Calif.
SPACE MATERIALS HANDBOOK, ed. by Claus G. Goetzel and John B. Singletary. Rept. on Contract AF 04(647)673. Jan 62, 521p. 476 refs.

DESCRIPTORS: *Spacecraft, Materials, *Space environmental conditions, Aerodynamic heating, Vibration, Upper atmosphere, Albedo, Solar radiation, Radiation hazards, Impact shock, *Temperature control, *Mirrors, *Optical materials, *Lubricants, Oils, Greases, Metal films, Polymers, Ceramic materials, Cermets, *Adhesives, Radiation effects, *Seals (Stoppers), *Gaskets, Fuels, *Electronic equipment, Semiconductor devices, Resistors, Potentiometers, Electron tubes, Capacitors, Elastomers, Laminates, *Antennas, Dielectrics, Electromagnetic lenses, Radomes, *Satellite antennas, *Rocket antennas, Structural parts, *Metals, Erosion, Cratering, *Organic materials, *Plastics, Plastic films, *Fibers (Synthetic), Liquids, *Glass, *Explosive materials, *Propellants, *Orbital trajectories.

The intent has been to collect information on space environments and to interpret the effects of these environments on materials to aid scientists and engineers engaged in designing and constructing spacecraft. Consequently, the present volume is not intended to serve as a complete design handbook but rather as a source of answers to those important questions relating to the effect of the space environment on materials which a designer might decide to use from other considerations.

NASA N63-18161 OTS $2.50

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
THE SIGNIFICANCE OF ATMOSPHERIC BALLISTICS IN ROCKET TECHNOLOGY, by G. H. R. Reisig. July 63, 101p. 34 refs. NASA TN-D-1830.

NASA N63-17217 OTS $1.10

Rensselaer Polytechnic Inst., Troy, N. Y.
NONLINEAR GUIDANCE SYSTEM FOR DESCENT TRAJECTORIES, by C. N. Shen. Rept. on NASA Grant NsG-14-59. [1962] 9p. 12 refs. NASA CR-50215.

PB 163 428 OTS $6.60

[Army Chemical Research and Development] Labs., Army Chemical Center, Md.
EVALUATION OF MILITARY INDIVIDUAL AND COLLECTIVE PROTECTION DEVICES AND CLOTHING, by John R. Hendrickson. Rept. for Oct-Nov 51, on Operation Jangle. July 52, declassified 1 June 62, 68p. 12 refs. Rept. no. WT-401.

DESCRIPTORS: *Protective clothing, *Armed forces supplies, *Breathing masks, *Protective treatments, Nuclear explosions, Decontamination, Ointments, Tanks (Containers), *Radiological contamination.

Under conditions resulting from surface and underground detonations of atomic bombs, tests were conducted on Chemical Corps impregnated and unimpregnated protective clothing, Individual Protective Mask M9A1 with M11 Canister, Tank Collective Protector E26 and E22, and Protective Ointment M5. Both impregnated and unimpregnated clothing were capable of preventing contact between the skin and radioactive dusts. Unimpregnated clothing demonstrated better contamination-decontamination characteristics, but the secondary radiation from all clothing was negligible. The protective cover was effective in preventing contamination of clothing. The M9A1 mask with M11 canister furnished complete protection against inhalation of radioactive dust. The filtering efficiencies of the E26 tank collective protectors were found to be very high, and no deficiencies were found in the unit. The filtering efficiencies of the E22 tank collective protectors were also high. Panels coated with M5 ointment were found to be much more highly contaminated than bare panels. (Author)

PB 163 429 OTS $7.60

Atomic Energy Commission, Div. of Biology and Medicine, Washington, D. C.
AEC COMMUNAL SHELTER EVALUATION, by Robert L. Corsbie. Rept. for Oct-Nov 51, on Operation Buster. Mar 52, declassified 25 May 62, 70p. Rept. no. WT-360; Prepared in cooperation with Los Alamos Scientific Lab.

DESCRIPTORS: *Shelters, Nuclear explosions, Models (Simulations), Tests, Soils, Site selection, *Radiological contamination, *Underground structures.

This report describes the test conducted on a prototype communal shelter proposed for installation at Atomic Energy Commission prime targets. The results confirmed theoretical design estimates to withstand dynamic overpressures but the blast loadings anticipated were not given. Additional data is needed to arrive at a structurally balanced design, and to balance protection against blast effects with protection against nuclear and thermal effects. Improved and more elaborate instrumentation is necessary to insure maximum data needed in precise evaluation of results. Consideration should be given to site conditions, so results can be interpreted in terms of soil conditions elsewhere.

WT-789 OTS $3.60

Atomic Energy Commission, Div. of Biology and Medicine, Washington, D. C.
PHYSICAL MEASUREMENTS OF GAMMA AND NEUTRON RADIATION IN SHELTER AND INSTRUMENTATION EVALUATION, by L. J. Deal, H. H. Rossi, and G. S. Hurst. Rept. for Mar-June 53. Aug 53, declassified 28 May 62. 37p. 4 refs.

NAS-NRC-826
Order from NAS-NRC $2.00

Building Research Advisory Board, National Research Council, Washington, D. C.
PROTECTION FOR WELLS AND SUCTION LINES FOR INDIVIDUAL WATER SUPPLY SYSTEMS, by Don W. Pray. Rept. on FHA Contract HA (--) fh-743. 1962, 27p. 21 refs. Rept. no. 20.

DESCRIPTORS: *Water supplies, *Well drilling, Pipes, *Corrosion inhibition, Corrosion resistant alloys, Wrought iron, Zinc coatings, Joints, *Contamination, Construction, Economics, Sanitary engineering.

Contents:
Recommendations of the special advisory committee
- Protection for wells
- Protection for Horizontal Suction Lines
- Joints
- Seals
- Vents
- Slope of Horizontal Suction Line

Supporting information
- General
- The Need for Well Protection
- Contamination
- Corrosion
- Joints
- Venting
- Economic Considerations
- Slope of Horizontal Suction Line

HW-76389 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
ADVANCEMENTS IN WATER TREATMENT AT HANFORD, by R. W. Pitman. Rept. on Contract AT(45-1)1350. 30 Jan 63, 13p.

PB 163 427 OTS $16.50

[IIT Research Inst.] Chicago, Ill.
AIR FORCE STRUCTURES PROGRAM. APPENDIX E. BLAST LOADING AND STRUCTURAL RESPONSE. VOLUME III. BLAST LOADING AND RESPONSE TO MODEL STRUCTURES, by Bert E. Pettitt. Interim rept. on Operation Greenhouse, Subcontract AF 33(038)9761. 27 Mar 51, declassified 19 July 61, 258p. 2 refs. Rept. no. WT-85.

DESCRIPTORS: *Structures, Explosions, *Blast, Shock waves, Loading (Mechanics), Drag, Mathematical analysis, Stresses, Buildings, Experimental data, Reinforced concrete, Slabs, Pressure

Part I of this report analyzes the loads on the structure under the Greenhouse test conditions and details the calculations for three of the buildings: a closed building (3. 3. 8a), a building with openings at one end (3. 3. 8b), and a building with openings at both front and back (3. 3. 8d). The loadings for all of the idealized models are presented in some detail. The response of these idealized buildings to the predicted loadings is treated in Part II. The type of equation involved is discussed fundamentally and the method of solution is presented. Since the models are structurally similar, only one example is given. However, this one is worked out in complete detail. The essential results, displacement curves, and acceleration curves are presented for each structure. (Author)

PB 163 430 OTS $9.10

[IIT Research Inst.] Chicago, Ill.
SCIENTIFIC DIRECTOR'S REPORT OF ATOMIC WEAPONS TESTS AT ENIWETOK, 1951. APPENDIX E. BLAST LOADING AND STRUCTURAL RESPONSE. SECTION I. GENERAL BLAST LOADING AND RESPONSE, by Bert E. Pettitt. Rept. on Operation Greenhouse, Contract AF 33(038)9761. 27 Mar 51, downgraded 27 Nov 54; declassified 18 Jan 62, 108p. 31 refs. Rept. no. WT-59.

DESCRIPTORS: *Nuclear weapons, Tests, Mathematical analysis, Structures, *Loading (Mechanics), Shock waves, Experimental data, Blast, Buildings, Pressure.

This section deals with the more general aspects of blast loading and responses. The development of the loading method was accomplished by a judicious study of known theory and a careful sifting of the existing and ever-increasing experimental data. These two, theory and experiment, are combined to produce a set of fundamental parameter plots and a rational load-computation method which will be verified only by future experimental data. Subjects for future investigations are discussed, and further experimental work is proposed.

PB 163 431 OTS $4.60

Illinois U., Urbana.
BEHABIOR OF UNDERGROUND STRUCTURES SUBJECTED TO AN UNDERGROUND EXPLOSION, by G. K. Sinnamon, R. E. Woodring and others. Rept. for Feb-May 55, on Operation Teapot, Contract DA 49-129-eng-324. 11 Oct 57, declassified 11 Aug 61, 51p. 15 refs. Rept. no. WT-1126, supersedes ITR-1126.

DESCRIPTORS: *Underground structures, Underground explosions, Nuclear explosions, *Nuclear explosion damage, Reinforced concrete, Test methods, Soil mechanics, Structural properties, Mathematical analysis, Structures, Soils, Stresses, Pressure.

Two buried reinforced concrete four-walled structures without floor or roof were tested, one at 200 feet and the other at 250 feet from a 1. 2 kt device buried at a depth of 67 feet. The structures were instrumented to give transient load and response data. In addition, provisions were made to obtain data on permanent displacements and strains. The crater formed by the explosion was unexpectedly small, being 146 feet in radius, so that the two targets were approximately 50 and 100 feet from the edge of the crater. The structures responded primarily as rigid bodies and followed the soil motion; consequently there was no structural damage. The permanent movements of the boxes were 3. 8 feet and 0. 5 foot, horizontally, away from the point of burst. It is concluded that buried structures of the type tested are difficult to damage structurally, unless located within or close to the edge of the crater and that, for structures outside of the crater, problems created by large earth movements and throwout might be critical for structures relatively close to the edge of the crater.

WT-798 OTS $5.60

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
EFFECTS OF OVERPRESSURES IN GROUP SHELTERS ON ANIMALS AND DUMMIES, by J. E. Roberts C. S. White, and T. L. Chiffelle. Rept. Mar-June 53, on Operation UPSHOT-KNOTHOLE. Sep 53, declassified 28 May 62. 60p. 4 refs.

WT-1161 OTS $13.00

Sandia Corp., Albuquerque, N. Mex.
EFFECTS OF AN ATOMIC EXPLOSION ON GROUP AND FAMILY TYPE SHELTERS, by L. J. Vortman. Rept. for Feb-May 55 on Operation TEAPOT. Dec 55, declassified 20 June 62. 188p. 10 refs.

PB 163 432 OTS $4.60

Stanford Research Inst. [Menlo Park] Calif.
EVALUATION OF MISSILE HAZARD UNDERGROUND SHOT, by R. B. Vaile, Jr. and V. Salmon. Rept. for Oct-Nov 51, on Operation Jangle. May 52, downgraded 25 Feb 60; declassified 11 May 61, 46p. 8 refs. Rept. no. WT-338.

DESCRIPTORS: *Underground explosions, *Nuclear explosion damage, Blast, Reinforced concrete, Buildings, Pavements, Explosion effects, *Fragmentation

The missile experiment performed as a part of the Jangle underground explosion test demonstrated that reinforced concrete walls and highways located 40 feet to 140 feet from ground zero were broken and thrown out as missiles. Material nearer than 40 feet (or perhaps 50 feet) was vaporized or pulverized to the extent that it was largely windborne. Missiles of military significance were found 400 feet to 3300 feet from ground zero. Those of major significance were in the range 400 feet to 1500 feet.

PB 163 433 OTS $6.60

Stanford Research Inst., Menlo Park, Calif.
ISOLATION OF STRUCTURES FROM GROUND SHOCK, by R. B. Vaile, Jr. Rept. for May-Oct 57 on Operation Plumbbob. 23 Apr 62, 64p. 4 refs. Rept. no. WT-142401, supersedes WT-1424.

DESCRIPTORS: *Underground structures, Reinforced concrete, Pipes, Steel, Cylindrical bodies, Rubber, *Vibration isolators, Soils, Shock waves, Glass, *Nuclear explosion damage, Soil mechanics, Mathematical analysis, Stresses, Explosions, Pressure

The effectiveness of frangible backfill (glass bottles) in protecting underground structures from the violent motions produced by nearby explosions was investigated. Two test structures and one comparison structure were used. Each test structure was a reinforced concrete pipe enclosing a steel cylinder separated from the pipe by rubber O-rings, with glass bottles placed around the sides and bottom of the pipe. The peak accelerations of these structures, produced by shear forces exerted against their sides, were reduced by the frangible backfill to 26 percent or less of those that structures in intimate contact with the soil would have experienced. Four years after the shot the structures were excavated. All the bottles around the sides of the test structure at 229 psi were completely crushed; only a fourth of the bottles at the 104-psi location were broken, most of these on the upper half of the structure. At the 229-psi location the soil apparently was stressed beyond failure, and the protective capabilities of the backfill were fully utilized. At the 104-psi location the backfill capabilities were 10 percent expended; the configuration could have accepted a second attack at 200 psi or four or five attacks at 100 psi. The soil beneath the two test structures moved down a greater distance than the structures, and the frangible elements beneath them showed no crushing and only minor fracturing.

WT-790 OTS $10.50

Vitro Corp. of America, New York
AEC SHELTER INSTRUMENTATION, by E. W. Ruhl, et al. Rept. for Mar-June 53 on Operation UPSHOT-KNOTHOLE. Aug 53, declassified 28 May 62. 140p. 5 refs.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Engines and Propulsion Systems

NASA N63-18037 OTS $10.50

Aerojet-General Corp., Azusa, Calif.
DESIGN GUIDE FOR PRESSURIZATION SYSTEM EVALUATION LIQUID PROPULSION ROCKET ENGINES. VOLUME 1-USE OF DESIGN GUIDE GENERAL DESIGN DATA, by F. W. Childs, T. R. Horowitz and others. Rept. covering 19 Apr 61-30 Sep 62, on NASA Contract NAS7-169. 30 Sep 62, 137p. NASA CR-50313; Rept. 2334.

NASA N63-17548 OTS $2.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
INVESTIGATION OF CATALYST BEDS FOR 98-PERCENT-CONCENTRATION HYDROGEN PEROXIDE, by Jack F. Runckel, Conrad M. Willis, and Leland B. Salters, Jr. June 63, 80p. 19 refs. NASA TN D-1808.

MATERIALS

AD-295 430 OTS $10.10

Army Chemical Research and Development Labs., Army Chemical Center, Md.
TWELFTH MATERIALS REVIEW, by Arthur Lyem. Nov 62, 122p. 379 refs. CRDL Special pub. 5-1; NASA N63-10436.

DESCRIPTORS: *Plastics, *Polymers, *Metals, *Alloys, *Fibers (Synthetic), Inorganic compounds, Fibers, Physical properties, Chemical properties, Organic compounds, Textiles, Radiation effects, Elastomers, Medicine, Synthesis, Processing, Polymerization, Materials, Bibliographies.

Contents:
High polymers
- Chemistry (including macromolecular chemistry)
- Technology (Including polymerization)
- Physical and chemical characteristics

Plastic materials
- Engineering and methods
- Materials of construction
- End-product behavior
- Nuclear aspects (radiological and thermal)
- Medical and biological considerations
- Commercial and military applications

Synthetic fibers
- Manufacturing techniques
- Textile wet-processing
- Properties
- Industrial applications

Miscellaneous organic and inorganic compounds
Metals and alloys.
(See also AD-276 621)

TID-17640 OTS $1.60

Argonne National Lab., Ill.
A PROPOSED SYSTEM TO OBTAIN HIGHER SPACE RESOLUTION IN NUCLEAR EMULSIONS, by J. H. Roberts, P. C. Chow (Northwestern U.) and G. R. Ringo. Rept. on Contract W-31-109-eng-38. Oct 62, 20p. 12 refs. UAC-6998.

PB 163 335 OTS $5.60

Battelle Memorial Inst., Columbus, Ohio.
TENSILE AND CREEP PROPERTIES OF GRAPHITE, by R. E. Adams and H. R. Nelson. 1 May 50, declassified 20 May 59, 57p. 6 refs. Rept. no. NEPA 1516; ATI 17 265.

DESCRIPTORS: *Heat resistant materials, *Graphite, Physical properties, Tensile properties, *Creep

Tensile and creep tests were made on C-18 and AGHT graphite at temperature up to 5100°F. (2820°C.). In agreement with other investigations, the tensile strength of graphite varied with temperature, reaching a maximum value at about 4500°F. (2482°C). The maximum tensile strength was approximately twice the room-temperature strength. The tensile strength of AGHT graphite was greatest in the direction of extrusion. Creep of graphite was characterized by an initial stage, during which the creep rate decreased. This was followed by a secondary stage, in which the creep rate remained constant until failure occurred. The creep rate of graphite was affected markedly by temperature and stress.

NAS-NRC-1084
Order from NAS-NRC OTS $2.00

Building Research Advisory Board, National Research Council, Washington, D. C.
THERMAL INSULATION THICKNESS CHARTS AND MATERIAL CHARACTERISTICS FOR PIPING. Rept. on NBS Contract CST-690. 1963, 15p. 1 ref. Task Group T-29 (Reconvened). FCC Technical rept. no. 45.

DESCRIPTORS: *Pipes, Materials, *Thermal insulation, Thickness, Tables.

The study has been divided into two principal parts--the development of tables from which the proper thickness of piping insulation can be easily and rapidly determined, and the determination of the most important properties which should be possessed by piping insulation. Thickness tables include piping insulations for 80° - 400° F service heating systems, other than underground heat-distribution systems.

NASA N63-17222 OTS $9.10

Emerson Electric Mfg. Co., St. Louis, Mo.
A COMPARISON OF THIN COATINGS OF PHENOLIC NYLON AND "THERMO-LAG" T-500 DURING EXPOSURE TO LOW CONVECTIVE HEAT FLUXES OF LONG DURATION. Rept. on NASA Contract NAS9-706. 21 Nov 62, 101p. 16 refs. Rept. 1414; NASA CR-50340.

AD-402 993 OTS $7.60

General Plastics Corp., Bloomfield, N. J.
PRODUCTION OF THIN POLYTETRAFLUOROETHYLENE RESIN (TEFLON) COATINGS BY ELECTRODEPOSITION METHOD, by Robert W. Logan. Final rept., 19 Mar 62-19 Mar 63, on Contract NOw-62-0600-C. [1963] 76p. 33 refs; NASA N63-15272.

DESCRIPTORS: *Plastic coatings, *Halocarbon plastics, Fluorocarbons, *Polyethylene plastics, *Electrodeposition, *Lubricants, Protective coverings, Production, Sintering.

An electrodeposition method of applying thin polytetrafluoroethylene resin ("Teflon") coatings has been developed which allows the application of crack-free films up to 0.001" thick in one coating operation. Polytetrafluoroethylene (TFE) coatings applied by this method are intended to supplement sprayed TFE coatings in lubricating, without the use of oils or greases, a wide variety of military equipment. Electrodeposited TFE coatings possess a very low coefficient of friction on steel, are smooth and free from blisters, cracks, coagulated particles and other surface defects and exhibit adhesion (under simulated dry lubricant conditions) comparable to sprayed TFE coatings. The electrodeposition process will allow the coating of parts or equipment that heretofore was difficult, if not impossible, to spray. In addition, due to the generally favorable edge in the economics of the electrodeposition process vs. the spray process, TFE may now be applied to parts which previously were not economically feasible to coat. The main limitation of the electrodeposition process is that only those metals which are anodically corrodible and which can withstand the 700°-750°F. sintering temperature can be coated. This eliminates aluminum, stainless steel and zinc, among others. (Author)

NCSC-2477-10 OTS $2.50

North Carolina State Coll. School of Textiles, Raleigh.
MODIFICATION OF TEXTILE FIBER PROPERTIES BY RADIATION-INDUCED GRAFT POLYMERIZATION, by Arthur A. Armstrong, Jr. and William K. Walsh. Annual rept., 1 Nov 61-31 Oct 62 on Contract AT(40-1)2477. 31 Oct 62, 117p. 5 refs.

Fuels, Lubricants, and Hydraulic Fluids

HW-77291 OTS $0.50

Hanford Atomic Products Operation, Richland, Wash.
THE DEVELOPMENT OF A DRAWING LUBRICANT, by Frank B. Quinlan. Rept. on Contract AT(45-1)1350. 16 Apr 63, 8p. NASA N63-17476.

AD-278 441 OTS $22.25

Monsanto Research Corp., Everett, Mass.
SYNTHESIS OF THIRTY-FIVE HYDROCARBON FUELS, by Stanley D. Koch, John H. Cornell, Jr. and others. Final rept., 15 Mar 60-22 Mar 62, on Contracts AF 33(616)7190, AF 33(600)38448, AF 33(616)5799, and AF 33(600)39634. May 62, 424p. 332 refs. ASD-TDR-62-408.

DESCRIPTORS: *Jet engine fuels, *Hydrocarbons, *Monocyclic compounds, *Polycyclic compounds, High temperature research, Stability, Infrared spectroscopy, Chromatographic analysis, Molecular structure, Synthesis.

Thirty-five hydrocarbons were prepared for evaluation as high-temperature jet fuels. Thirty-two of them were prepared in two-liter quantity or more. Synthesis of 59 other polycyclic hydrocarbons for the same purpose under three earlier contracts is also described. Forty-one of the 94 compounds described had never been previously prepared. (Author)

AD-403 419 repriced OTS $1.25

Surface Lab., Mass. Inst. of Tech., Cambridge.
FRICTION AND WEAR AT ELEVATED TEMPERATURES, by Ernest Rabinowicz and Masaya Imai. Rept. on Fundamental Research on Macromolecular Materials and Lubrication Phenomena, Contract AF 33(616)7648. 41p. 16 refs. WADC-TR-59-603, Pt. IV. NASA N63-16109.

DESCRIPTORS: *Friction, *Metals, *Lubrication, Melting, Surfaces, Powder metals, Stainless steel, Glass, Sodium compounds, Thiosulfates, High temperature research.

Measurements were carried out of the friction coefficient as a function of temperature using surfaces of stainless steel covered by low-melting metals and non-metals applied in powder form. Some work was also done with a few other metal and non-metal surfaces. In cases where the interaction between the low melting substances and sliding surface is high, as revealed by the occurrence of wetting, the friction reaches a peak just below the melting temperature of

the substance, and then drops to considerably lower values just above the melting point. The peak below the melting temperature is associated with the formation of large adhering fragments of the low melting substance on the sliding surface. When there is no wetting, the low-melting substance has, either below or above its melting point, essentially no effect on the friction. (Author)

Rubber and Elastomers

PB 163 340 OTS $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
RADIATION CHEMICAL EFFECTS ON POLYURETHANES. I. CROSSLINKING, by J. F. Pestaner and L. H. Gevantman. 17 Feb 60, 13p. 8 refs. Research and development technical rept. USNRDL-TR-406; AD-236 105.

DESCRIPTORS: *Reactor materials, *Elastomers, *Isocyanate plastics, *Urethanes, *Radiation damage, Radiation chemistry, Chemical bonds, Solvents.

A quick and useful method for measuring radiation damage in polyurethane elastomers was examined by using the relationship between the extent of crosslinking and the degree of swelling in a solvent. A linear relationship was found to exist between radiation dose and crosslinking using three different solvents. Changes in crosslinking were observable for doses as low as 10^6 rads. (Author)

AD-403 305 OTS $0.75

Rock Island Arsenal Lab., Ill.
COMPRESSION SET OF ELASTOMERS AT ELEVATED TEMPERATURES, by E. W. Bergstrom. 14 Mar 63, 24p. 10 refs. Technical rept. no. 63-798; NASA N63-16249.

DESCRIPTORS: *Heat resistant materials, *Elastomers, *Synthetic rubber, *Silicones, Methyl radicals, Vinyl radicals, Fluorides, *Butyl rubber, *Isoprene, Compressive properties, Aging, Hardening, Additives, Metallic compounds, Oxides.

Compression set tests (constant deflection method of ASTM D395-55) were carried out on heat resistant rubber vulcanizates for periods as long as 28 days at temperatures up to 500°F. It was found that some silicone rubbers did not have set values at elevated temperatures as low as might be expected from their excellent resistance to heat aging. Cure time was found to have a significant effect on the set of isobutylene/isoprene vulcanizates. Increased cure time resulted in lower set even though the original cure time may have been optimum for other properties. Certain metal oxide additives significantly lowered the set of some silicones. No one additive was found, however, which lowered the set of all four types of silicones; namely, dimethyl, methyl vinyl, fluoro and high strength. Additives which had been found previously to improve the heat resistance of silicones proved to be ineffective in lowering set. (Author)

MATHEMATICS

AD-291 553 OTS $3.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
FITTING EMPIRICAL PARTICLE SIZE DISTRIBUTIONS TO THE LOG NORMAL DISTRIBUTION, by R. B. Schnell. Sep 62, 33p. 38 refs. Technical rept. CRDLR 3145.

DESCRIPTORS: *Statistical distribution, *Bibliographies, Curve fitting, Algebra, Errors, Particles, Numerical methods and procedures, *Particle size.

A straightforward, algebraic method of "fitting" the log normal distribution to data subject to systematic error or bias has been proposed. When this systematic error can be assigned a physical explanation, the data may be rectified to give a log normal distribution, subject only to random error that is not necessarily normally distributed. While the examples given are concerned with particle size distributions, the method is easily adapted to other fields, so long as there is a logical basis for the assignment of errors. (Author)

PB 163 339 OTS $12.50

David Taylor Model Basin, Washington, D. C.
LECTURES ON APPLIED MATHEMATICS. THE CALCULUS OF VARIATIONS, by Francis Murnaghan. May 61, 177p. Rept. 1489.

DESCRIPTORS: *Applied mathematics, *Calculus of variations, Mechanics, Propagation.

The Lagrangian Function and the Parametric Integrand
Extremal Curves; The Euler-Lagrange Equation
Lagrangian Functions Which Are Linear in x_t
The Legendre Condition for a Minimal Curve
Proof of the Legendre Condition
Constrained Problems; The Hamilton Canonical Equations
The Reciprocity between L and H; The Transversality Conditions
Extremal Fields; The Hilbert Invariant Integral
The Weierstrass E-Function; Positively Regular Problems
A Simple Example of the Construction of an Extremal Field; Rayleigh Quotients and the Method of Rayleigh-Ritz
The Principle of Maupertuis; The Propagation of Waves
Problems Whose Lagrangian Functions Involve Derivatives of Higher Order than the First
Multiple-Integral Problems of the Calculus of Variations
Constrained Problems; Characteristic Numbers
Multiple-Integral Problems Whose Lagrangian Functions Involve Derivatives of Higher Order than the First
The Courant Maximum-Minimum Principle

NASA N63-18160 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TABLES FOR THE INTEGRAL OF THE CIRCULAR BIVARIATE NORMAL FREQUENCY FUNCTION, by William L. Weaver and Kathleen C. Wicker. July 63, 38p. 7 refs. NASA TN-D-1819.

UCRL-10734 OTS $0.50

Lawrence Radiation Lab., U. of California, Berkeley.
LINEAR COMPUTATION OF FUNCTION APPROXIMATION WITH APPLICATION TO FITTING AND EDITING TWO-DIMENSIONAL DATA, by Jonathan D. Young. Rept. on Contract W7405-eng-48. 26 Mar 63, 7p. 1 refs. NASA N63-16561.

NASA N63-18130 OTS $1.00

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
ON THE ERROR PROPAGATION OF SOME INTERPOLATION FORMULAS FOR SECOND-ORDER DIFFERENTIAL EQUATIONS, by Erwin Fehlberg. July 63, 31p. refs. NASA TN D-1834.

AD-294 722 repriced OTS $1.25

Naval Ordnance Lab., White Oak, Md.
UPPER AND LOWER BOUNDS FOR THE APSIDAL ANGLE IN THE THEORY OF THE HEAVY SYMMETRICAL TOP, by J. B. Diaz and F. T. Metcalf, 4 Oct 62, 43p. 22 refs. Rept. no. NOLTR 62-131; Mathematics Dept. rept. no. M-29; NASA N63-11987.

DESCRIPTORS: *Spheres, *Particles, *Gravity, *Azimuth, *Bodies of revolution, Inequalities, Kinetic theory, Potential theory, Convex sets, Functions, Surfaces, Motion, Vector analysis, Integrals, Differential equations.

A simple method is developed for obtaining upper and lower bounds for the apsidal angle which occurs in the theory of the heavy symmetrical top. This method is employed to give a quick derivation and an improvement of the upper and lower bounds obtained by W. Kohn. An advantage of the present method is the simplification which arises from eliminating the need for contour integration. The sharpness of the bounds is demonstrated, again without contour integration. The particular method in question is illustrated first in the theory of the spherical pendulum. (Author)

NASA N63-17124 OTS $2.60

RIAS, Inc., Baltimore, Md.
TOPOLOGICALLY CONVEX SETS AND FIXED POINT THEORY, by G. Stephen Jones. Rept. on NASA Contracts NASr-103; AF 49(638)382; DA-36-034-ORD-3514 RD; and Nonr-3693(00). Apr 63, 24p. 4 refs. RIAS-TR-63-8; NASA CR-50251.

TID-17737 OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
FACTORIAL EXPERIMENTS IN ENVIRONMENTAL TESTING WITH FACTORS APPLIED SEQUENTIALLY, by R. R. Prairie and W. J. Zimmer. Rept. on Contract AT(29-1)789. Jan 63, 19p. 1 ref. SCDC-2996.

Computing Devices

TID-17788 OTS $1.10

Argonne National Lab., Ill.
ANALOG-COMPUTER STUDY OF NOISE MEASUREMENT ERRORS, by E. C. Cohn. on Contract W31-109-eng-38. 1 Oct 62, 7p. 8 refs. RED-EPM-106.

TID-18030 OTS $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
A DISC-ORIENTED REMOTE INQUIRE PHILCO-2000 SYSTEM, by E. D. Reilly, Jr. Rept. on Contract W-31-109-eng-52. 1962, 6p. 3 refs.

MECHANICS

IS-419 OTS $2.50

Ames Lab., Iowa State U. of Science and Tech.
TURBULENT MASS TRANSFER IN LIQUID STREAMS, by Richard Charles Seagrave and R. W. Fahien. Rept. on Contract W7405-eng-82. Aug 61, 140p. 134 refs.

PB 163 332 OTS $3.60

Institute of Aerophysics, U. of Toronto (Canada).
MEASUREMENT OF TWO-POINT CORRELATIONS OF VELOCITY NEAR A CIRCULAR CYLINDER SHEDDING A KARMAN VORTEX STREET, by M. Y. el Baroudi. Rept. on DRB Grant 9551-02 and Contract AF 49(638)249. Jan 60, 35p. 3 refs. UTIA Technical note no. 31; AFOSR TN-60-835; AD-247 495.

DESCRIPTORS: Measurement, *Velocity, Cylindrical bodies, *Vortices, Pressure, *Gas flow, *Statistical functions.

Results of an experimental investigation of two-point correlations of velocity near a circular cylinder shedding a Karman vortex street are presented. The measurements were made along a line parallel to the generator of the cylinder which is at 90° from the upstream direction. The cylinder was mounted transversely in an air-stream, and two hot-wire probes were used as anemometers. The curves of correlation coefficient versus probe separation approach zero as the separation between the probes is increased to large values. A plot of correlation length versus Reynolds

number, based in part on a conservative extrapolation, is also presented and compared with correlation length data from pressure measurements taken from UTIA technical note 23. (Author)

NASA N63-18132 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
ARREST OF A MOVING MASS BY AN ATTACHED MEMBRANE, by Manuel Stein. July 63, 14p. NASA TN D-1928.

NASA N63-18232 OTS $1.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
THEORETICAL ELASTIC STRESS DISTRIBUTIONS IN CASSINIAN DOMES, by David A. Spera and Robert H. Johns. July 63, 55p. 12 refs. NASA TN-D-1741.

TID-17773 OTS $2.60

New Mexico U., Albuquerque.
CONSTRUCTION AND EVALUATION OF A THREE DIMENSIONAL STRAIN ROSETTE, by W. E. Baker and R. C. Dove. Rept. on Contract AT(29-1)789. Dec 62, 26p. 4 refs. SCDC-2968.

TID-17730 OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
INTERPRETATION OF VIBRATION SIGNALS, by M. R. Madsen. Rept. on Contract AT(29-1)789. Jan 63, 14p. SCDC-2994.

Aerodynamics and Pneumatics

NASA N63-18254 OTS $5.60

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
MEASUREMENTS OF NEAR FIELD PRESSURES OF SUBSONIC JETS, by E. Mollo-Christensen. Rept. on NASA Grant NsG-31-60. Apr 63, 54p. 18 refs. NASA CR-50585; ASRL-TR-1009.

NASA N63-18162 OTS $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
MEASUREMENT OF THE HEAT TRANSFER TO BODIES OF REVOLUTION IN FREE FLIGHT BY USE OF A CATCHER CALORIMETER, by Gary T. Chapman and Charles T. Jackson, Jr. July 63, 39p. 8 refs. NASA TN-D-1890.

NASA N63-13221 OTS $0.75

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
WIND-TUNNEL TESTS OF TWO VTOL PROPELLERS IN DESCENT, by Paul F. Yaggy and Kenneth W. Mort. Mar 63, 26p. 1 ref. NASA TN D-1766.

PB 163 392 OTS $4.60

Brown U., Providence, R. I.
INVISCID FLOW IN THE STAGNATION POINT REGION OF VERY BLUNT-NOSED BODIES AT HYPERSONIC FLIGHT SPEEDS, by Ronald F. Probstein. Rept. on Contract AF 33(616)2798. Sep 56, 46p. 20 refs. WADC TN 56-395; AD-97 273.

DESCRIPTORS: *Hypersonic flow, *Stagnation point, Aerodynamic configurations, *Blunt bodies, Hypersonic characteristics, *Shock waves.

An approximate method is given for solving the flow field behind a detached shock wave in the stagnation point region of blunt bodies with large radius of curvature noses. For such a flow the basic governing parameter is shown to be the density ratio across the detached shock wave, irrespective of whether the gas undergoes chemical changes, such as dissociation and ionization, across the shock. The method of solution is illustrated by considering in detail the stagnation region of a flat-nosed body.

NASA N63-18136 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECTS OF ROUNDING CORNERS AND LEADING EDGES ON THE WINDWARD-SURFACE PRESSURES OF A DELTA WING SWEPT 65° AT A MACH NUMBER OF 5.96 AT ANGLES OF ATTACK FROM 65° TO 115° AND ANGLES OF ROLL FROM 0° TO 25° AT 90° ANGLE OF ATTACK, by Theodore J. Goldberg and Doris K. Blanchard. July 63, 34p. 13 refs. NASA TN D-1959.

NASA N63-18211 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LOADS INDUCED ON A FLAT PLATE AT A MACH NUMBER OF 4.5 WITH A SONIC OR SUPERSONIC JET EXHAUSTING NORMAL TO THE SURFACE, by William Letko. July 63, 25p. 8 refs. NASA TN-D-1935.

NASA N63-18129 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LOW-SUBSONIC MEASUREMENTS OF STATIC AND DYNAMIC STABILITY DERIVATIVES OF SIX FLAT-PLATE WINGS HAVING LEADING-EDGE SWEEP ANGLES OF 70° TO 84°, by Robert E. Shanks. July 63, 30p. 8 refs. NASA TN-D-1822.

NASA N63-18135 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
PRESSURE DISTRIBUTIONS ON BLUNT DELTA WINGS AT ANGLES OF ATTACK UP TO 90° AND MACH NUMBER OF 6.85, by Peter T. Bernot. July 63, 40p. 17 refs. NASA TN D-1954.

NASA N63-18163 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TRAILBLAZER I REENTRY-BODY WIND-TUNNEL TESTS AT A MACH NUMBER OF 6.7 WITH THEORETICAL AERODYNAMICS AND A LIMITED DYNAMICS ANALYSIS, by Herbert R. Schippell. July 63, 25p. 6 refs. NASA TN-D-1936.

NASA N63-17545 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TRANSONIC INVESTIGATION OF THE STATIC LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF LOW-ASPECT-RATIO WING-BODY CONFIGURATIONS AT ANGLES OF ATTACK FROM 0° TO 90°, by Charles D. Trescot, Jr., Lawrence E. Putnam, and Cuyler W. Brooks, Jr. June 63, 37p. 5 refs. NASA TN D-1947.

NASA N63-18234 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
USE OF AERODYNAMIC PARAMETERS FROM NONLINEAR THEORY IN MODIFIED-STRIP-ANALYSIS FLUTTER CALCULATIONS FOR FINITE-SPAN WINGS AT SUPERSONIC SPEEDS, by E. Carson Yates, Jr., and Robert M. Bennett. July 63, 39p. 20 refs. NASA TN-D-1824.

AD-286 890 OTS $17.00

Lockheed Aircraft Corp., Burbank, Calif.
STUDY TO DETERMINE AERODYNAMIC CHARACTERISTICS ON HYPERSONIC RE-ENTRY CONFIGURATIONS. PART II - ANALYTICAL PHASE, VOLUME 2 - DESIGN CHARTS, by Frank S. Malvestuto, Jr., Phillip J. Sullivan and others. Rept. on Contract AF 33(616)6649. Aug 62, 263p. Rept. no. LAC/370285; WADD-TR-61-56, Part II, Volume 2.

DESCRIPTORS: *Re-entry vehicles, *Hypervelocity vehicles, Hypersonics, Shock waves, Pressure, Lift, Stresses, Friction, Temperature, Drag, Velocity, Blunt bodies, Tables, Aerodynamic configurations, *Aerodynamics.

This volume presents charts and procedures for rapid engineering estimates of aerodynamic parameters for complete configurations and configuration components. Using the design charts and procedures presented herein, aerodynamic coefficients may be estimated for speeds covering the supersonic and hypersonic ranges of Mach number. The theoretical methods used in the preparation of this volume are discussed in Volume I of this report. (Author)

NASA N63-17552 OTS $0.75

Manned Spacecraft Center, National Aeronautics and Space Administration, Houston, Tex.
EQUATIONS FOR THE NEWTONIAN STATIC AND DYNAMIC AERODYNAMIC COEFFICIENTS FOR A BODY OF REVOLUTION WITH AN OFFSET CENTER-OF-GRAVITY LOCATION, by Robert C. Ried, Jr., and Edward E. Mayo. June 63, 23p. 5 refs. NASA TN D-1085.

Hydrodynamics, Hydraulics, and Hydrostatics

PB 163 390 OTS $4.60

David Taylor Model Basin, Washington, D. C.
EXPERIMENTAL AND THEORETICAL STUDIES OF HYDROFOIL CONFIGURATIONS IN REGULAR WAVES, by Patrick Leehey and John M. Steele, Jr. Oct 57, 43p. 4 refs. AD-151 412.

DESCRIPTORS: Hydrofoil boats, *Hydrofoils, Ship models, *Water waves, Equations of motion, Linear systems, Stability

This report presents a comparison of the experimentally measured and theoretically predicted values of the heave and pitch responses of area stabilized hydrofoil configurations to regular waves and to transient pulses. The theoretical responses were computed from the equations given by Weinblum in "Approximate Theory of Heaving and Pitching of Hydrofoils in Regular Shallow Waves," TMB Report C-479. Curves of heave and pitch amplitude magnification and phase lag are given as functions of wavelength. The approximate linearized theory is found to give a qualitatively correct prediction of resonance and orbital motion effects. The theoretical amplitude magnifications are greater than the measured ones for most conditions, particularly for heave in following seas. This is believed to be caused principally by the neglect of nonlinear terms in the equations of motion. A Mid-foil can be used with a tandem Vee-foil to cancel heave response to following seas of wavelength approximately equal to the outer foil spacing. (Author)

PB 163 389 OTS $5.60

David Taylor Model Basin, Washington, D. C.
THE THEORETICAL PREDICTION OF THE LONGITUDINAL MOTIONS OF HYDROFOIL CRAFT, by T. Francis Ogilvie. Nov 58, 58p. 7 refs. Rept. 1138; AD-206 647.

DESCRIPTORS: Hydrofoil boats, *Hydrofoils, Ship models, *Water waves, *Equations of motion, *Nonlinear differential equations, Analog systems, Downwash, Programming (Computers)

The nonlinear theory of Weinblum for predicting the longitudinal response of hydrofoil craft in waves is modified, and the results of analog computations based on this theory are presented for comparison with available experimental data. The complete nonlinear equations are used in the computations, and it is shown that the nonlinearities affect the oscillatory amplitudes only slightly but that they cause large steady components of heave and sometimes of pitch. The steady heave is often as large as the amplitude of oscillation, and is always downward, tending to cause the craft to crash. The effects of unsteadiness are investigated, and it is shown that the forces are reduced as much as 40% because of unsteadiness but that there is little net effect on the amplitudes of heave and pitch. Transient responses are calculated, consideration being given to nonlinearities and unsteadiness. From the experi mental data, it is concluded that the theory gives good predictions of the amplitudes of heave and probably of pitch, and fair predictions of phase. (Author)

PB 163 378 OTS $1.10

David Taylor Model Basin, Washington, D. C.
YIELD FAILURE OF STIFFENED CYLINDERS UNDER HYDROSTATIC PRESSURE, by M. E. Lunchick. Jan 59, 8p. 8 refs. Rept. 1291.

DESCRIPTORS: *Stiffened cylinders, *Hydrostatic pressure, *Failure (Mechanical), Stresses, Theory, Experimental data, Correlation techniques, Measurement, Structural shells, Cylindrical bodies.

Experimental results are presented of hydrostatic tests of stiffened cylinders failing by axisymmetric yielding. These results are compared with existing theories predicting the collapse pressure as well as a new method presented in this paper. This method is based on an elastic-plastic analysis of a stiffened cylinder comprised of an ideally plastic material. The experimental collapse pressures agree best with theories using a Hencky-von Mises criterion of yielding and allowing for plastic reserve strength after the initiation of yielding. (Author)

TID-17719 OTS $1.60

Illinois U., Urbana.
BUBBLE MOTION IN TURBULENT LIQUID STREAM, by B. T. Chao. Quarterly progress rept. no. 6, 15 Sep-15 Dec 62, on Contract AT(11-1)1069. 2 Jan 63, 18p. 2 refs.

METALLURGY

NAA-SR-Memo-7832 OTS $1.10

Atomics International, Canoga Park, Calif.
LOW PRESSURE CONTACT CARBURIZATION OF 304 STAINLESS STEEL AND GRAPHITE, by S. K. Lee. Rept. on Contract AT(11-1)GEN-8. 19 Oct 62, 9p. 3 refs.

WAPD-T-1549 OTS $4.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
THE DEVELOPMENT OF THE ZIRCALOYS, by Stanley Kass. Rept. on Contract AT(11-1)GEN-14. Oct 62, 48p.

GA-2881 OTS $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
PREPARATION OF (Th, U)C_2 FUEL PARTICLES FOR THE HTGR, by Walter V. Goeddel and Howard E. Shoemaker. Rept. on Contract AT(04-3)314. 12 Nov 62, 18p. 44 refs.

GA-3197 OTS $3.60

General Atomic Div., General Dynamics Corp., San Diego, Dalif.
RADIATION STUDIES OF GRAPHITE-MATRIX FUEL BODIES CONTAINING (Th, U)C_2 FUEL PARTICLES, by Walter V. Goeddel. Rept. on Contract AT(04-3)314. 16 Nov 62, 38p. 29 refs.

HW-73540 OTS $4.60

Hanford Atomic Products Operation, Richland, Wash.
DEVELOPMENT OF THE CATHODIC ETCHING OF METALS AT PRESSURES FROM ATOMOSPHERIC TO THE GASEOUS DISCHARGE REGION, by T. B. Correy. Rept. on Contract AT(45-1)1350. June 62, 48p. 7 refs. NASA N62-14275.

HW-73759 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
SPECIFICATIONS--FLAT, NOTCHED TENSILE SPECIMENS, by A. L. Bement. Rept. on Contract AT(45-1)1350. 22 May 62, 4p.

HW-74643 OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
X-RAY DETERMINATION OF SURFACE STRESSES NEAR WELDS IN MILD STEEL PIPES, by D. R. Green and M. C. Lambert. Rept. on Contract AT(45-1)1350. Aug 62, 21p. 9 refs.

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FUNDAMENTALS OF UNDERGROUND CORROSION AND CATHODIC PROTECTION. Rept. on NBS Contract CST 690. 1963, 49p. 8 refs. FCC Symposium-Workshop rept. no. 2.

DESCRIPTORS: *Conferences, *Underground structures, *Pipes, *Corrosion, *Cathodic protection, *Electrical equipment, Operation, *Soils, Electrical properties.

Contents:
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UNDERGROUND CORROSION CATHODIC PROTECTION, AND REQUIRED FIELD MEASUREMENTS, DECEMBER 7-8, 1961. 1962, 53p. Federal Construction Council Symposium-workshop rept. no. 1.

DESCRIPTORS: *Cathodic protection, *Corrosion, *Corrosion inhibition, *Underground structures, *Metals, Pipes, Soils, Electrolysis, Electrolytes, Resistance (Electrical), Electric potential, Anodes, Zinc, Magnesium, Aluminum, *Coatings, Protective treatments, Bituminous coatings, Plastic coatings, Tapes, Waxes, Greases, *Test equipment, Voltmeters, Ammeters, Potentiometers, Multimeters, *Conferences.

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DESCRIPTORS: *Airframes, Guided missiles, Supersonic planes, Aviation safety, Reliability, *Fatigue (Mechanics), *Creep, *Metals, High temperature research.

The solution of the problem of attaining adequate safety and reliability in supersonic aircraft structures operating under conditions under which the damaging effects of cycle sensitivity (fatigue) and time-sensitivity (creep) of the structural material combine in gradually reducing the resistance of the structure requires the development of simplified procedures for the evaluation of the combined damage accumulation, which embody both the physical and probabilistic aspects of design. The present report attempts to develop the basis for an approach to the solution of this problem, for which no adequate experimental information exists at present. One of its purposes is to provide the guidelines for the planning of tests and experiments, the results of which would be relevant for structural design. (Author)

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THE TRANSMISSION OF FAST NEUTRONS THROUGH ALUMINUM, IRON, AND LEAD, by William Walton Dunn. Master's thesis. Mar 57, 35p. 7 refs. Rept. no. GNE-57[-1] AD-124 760.

DESCRIPTORS: *Shielding, *Aluminum, *Iron, *Lead, *Fast neutrons, Neutron scattering, Inelastic scattering, Attenuation, *Neutron cross sections, Neutron detectors.

Three common non-hydrogenous materials, aluminum, iron, and lead were selected for experimentation to determine the energy deposition suffered by the fast neutrons in passing through up to about five inches of these materials. The log of the six data points, taken at even intervals of 15/16" up to a thickness of 4-11/16" for each material, was used to approximate the best straight line between the points by the method of least squares. From the respective straight line approximations, the half thickness for each material was calculated and the results were as follows: Aluminum 8.2 inches, Iron 4.5 inches, Lead 6.6 inches. By assuming the half thickness were dependent primarily on the inelastic scattering cross sections, the results are in agreement with the theoretical and measured inelastic cross sections for these materials.

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SM-2 HORIZONTAL STEAM GENERATOR ANALYSIS, by H. F. Van Kessel. Rept. on Contract DA 44-192-ENG-7. 1 Nov 59, 121p. 16 refs. APAE Memo. no. 231; AD-228 692.

DESCRIPTORS: *Nuclear power plants, *Steam power plants, Analog computers, Load distribution, Design, Tests, Analysis, Generators.

A horizontal steam generator design for the SM-2 is subjected to a theoretical analysis in order to determine the performance of such a steam generator under steady state operating conditions and during load transients. The analog computer is used to analyze the steam generator behavior during load transients. The effect of various design changes on the response of the steam generator to step changes in load was determined. The new horizontal steam generator design is compared to the existing vertical steam generator design for weight, size, price and performance. (Author)

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CERAMIC-MATRIX FUELS CONTAINING COATED PARTICLES. Prepared in cooperation with Battelle Memorial Inst., Columbus, Ohio. Proceedings of a Symposium held at Battelle Memorial Institute, Nov 5-6, 1962. 499p. 137 refs.

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Atomic Energy Commission. Div. of Reactor Development, Washington, D. C.
MINUTES OF THE ANNUAL ATOMIC ENERGY COMMISSION WELDING CONFERENCE HELD IN SAN ANTONIO, TEXAS, October 3-6, 1960. May 63, 272p. 16 refs. NASA N63-17251.

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Hanford Atomic Products Operation, Richland, Wash.
MECHANICAL SEALS FOR ORGANIC FLUIDS, by H. L. Floyd. Phase rept. no. 1, 1 June 58, on Contract AT(45-1)1350. 1 Oct 58, 9p.

HW-SA-2861 OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
NONDESTRUCTIVE TESTING AS AN ENGINEERING PROFESSION, by D. C. Worlton. Rept. on Contract AT(45-1)1350. 29 Dec 62, 27p.

HW-75139 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
NPR TUBE-TO-NOZZLE JOINT LEAK TEST WITH SCRATCHED TUBE, by D. W. Keefer. Rept. on Contract AT(45-1)1350. 3 Oct 62, 8p.

HW-76559 OTS $2.50

Hanford Atomic Products Operation, Richland, Wash.
RESEARCH AND DEVELOPMENT PROGRAMS EXECUTED FOR THE DIVISION OF REACTOR DEVELOPMENT, ed. by M. M. Hendrickson and J. K. Green. Quarterly progress rept., Oct-Dec 62 on Contract AT(45-1)1350. Jan 63, 114p. 12 refs. NASA N63-17456.

HW-68067(Rev.1) OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
SPECIFICATION--HEATER, ELECTRIC RESISTANCE, SHEATHED, FOR NUCLEAR SERVICE, by Bert S. Kosut. Rept. on Contract AT(45-1)1350. 10 July 62, 23p.

NASA N63-18209 OTS $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
LEAK-RATE TESTING OF THE NASA PLUM BROOK REACTOR CONTAINMENT VESSEL, by Edward G. Keshock and Claude E. DeBogdan. July 63, 34p. 10 refs. NASA TN-D-1731.

NP-12048 OTS $8.10

Nevada U., Reno.
HAZARDS SUMMARY FOR THE L-77 LABORATORY REACTOR FOR THE UNIVERSITY OF NEVADA, RENO. 14 Sep 62, 83p. 13 refs.

NMI-7215A OTS $2.60

Nuclear Metals, Inc., Concord, Mass.
EVALUATION OF RESTRAINT TUBES 132 AND 133, by E. F. Jordan. Rept. on Contract AT(20-1)1565. 14 June 63, 26p. 6 refs.

TID-17633 OTS $1.10

Oak Ridge Gaseous Diffusion Plant, Tenn.
CRITICAL INTERACTION POTENTIALS OF WATER MODERATED UF_6 ARRAYS, by C. E. Newlon. Rept. on Contract W7405-eng-26. Jan 63, 7p. 2 refs.

TID-17657 OTS $1.10

Phillips Petroleum Co., Idaho Falls.
DETERMINATION OF WEIGHT OF TOTAL MATERIAL TO BE PROCESSED IN PRIVATE REACTOR FUEL PROCESSING, by F. H. Tingey. Rept. on Contract AT(10-1)205. 4p.

WCAP-4125 OTS $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
CVTR PROJECT, CAROLINAS VIRGINIA NUCLEAR POWER ASSOCIATES, INC. Monthly progress rept. May 62, on Contract AT(30-1)2289. 17p.

WCAP-4129 OTS $1.10

Westinghouse Electric Corp., Pittsburgh, Pa.
CVTR PROJECT, CAROLINAS VIRGINIA NUCLEAR POWER ASSOCIATES, INC. Monthly progress rept. Sep 62, on Contract AT(30-1)2289. 6p.

WCAP-4131 OTS $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
CVTR PROJECT, CAROLINAS VIRGINIA NUCLEAR POWER ASSOCIATES, INC. Monthly progress rept. Nov 62, on Contract AT(30-1)2289. 7p. 14 refs.

Nuclear Reactions

UCRL-10718 OTS $2.25

Lawrence Radiation Lab., U. of California, Berkeley.
EFFECTS OF THE SINGLE PION EXCHANGE IN THE REACTION $p + p \rightarrow n + p + \pi^+$, by Joseph T. Lach. Doctoral thesis. Rept. on Contract W7405-eng-48. 11 Mar 63, 107p. 33 refs. NASA N63-16571.

UCRL-10703 OTS $2.25

Lawrence Radiation Lab., U. of California, Berkeley.
STUDY OF $\pi^- + p \rightarrow \pi^- + \pi^+ + n$ AT 1.25 AND 1.75 BeV/c FOR LOW-NUCLEON-MOMENTUM-TRANSFER COLLISIONS: EVIDENCE FOR PION-PION INTERACTIONS, by William Brule Johnson. Doctoral thesis. Rept. on Contract W7405-eng-48. 27 Feb 63, 97p. 33 refs. NASA N63-15889.

UCRL-10585 OTS $2.25

Lawrence Radiation Lab., U. of California, Berkeley.
A STUDY OF THE π+IN THE REACTION $\pi^- + p \rightarrow \pi^+ + \pi^- + n$ AT 365 AND 432 MeV, by Julius Solomon. Doctoral thesis. Rept. on Contract W7405-eng-48. 17 Jan 63, 101p. 38 refs. NASA N63-16036.

Radioactivity

LAMS-2870 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
BETA-GAMMA RADIOACTIVITY IN ENVIRONMENTAL AIR AT LOS ALAMOS, NEW MEXICO, FOR 1962, by Jack W. Aeby and W. R. Kennedy. Rept. on Contract W7405-eng-36. 1 Mar 63, 24p.

NSEC-80 OTS $2.60

Nuclear Science and Engineering Corp., Pittsburgh, Pa.
ANALYSIS AND EVALUATION OF FALLOUT RADIOACTIVITY IN PITTSBURGH PRECIPITATION, by R. C. Koch, L. G. Davis, and C. R. Wilson. Status rept. no. 1, 1 July-31 Oct 62, on Contract AT(30-1)3072. 15 Nov 62, 21p. 9 refs.

Waste Disposal

HW-73933 OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
REMOTE WELDING CLOSURE FOR WASTE AND FISSION PRODUCT CONTAINERS, by V. L. Hammond. Interim rept. on Contract AT(45-1)1350. 27 July 62, 21p.

HW-77299 OTS $1.50

Hanford Atomic Products Operation, Richland, Wash.
RESEARCH AND DEVELOPMENT ACTIVITIES. FIXATION OF RADIOACTIVE RESIDUES, ed. by E. R. Irish. Quarterly progress rept. Jan-Mar 63, on Contract AT(45-1)1350. Apr 63, 53p. 10 refs.

PHYSICS

IS-623 OTS $1.60

Ames Lab., Iowa State U. of Science and Tech.
HIGH PRESSURE RESEARCH AT LOW TEMPERATURES, by C. A. Swenson. Rept. on Contract W-7405-eng-82. 22 Feb 63, 18p. 21 refs.

GA-3542 OTS $3.00

General Atomic Div., General Dynamics Corp., San Diego, Calif.
INTEGRAL NEUTRON THERMALIZATION, by J. R. Beyster, J. R. Brown, and H. C. Honeck. Annual summary rept. 1 Oct 61-30 Sep 62, on Contract AT(04-3)167. [1962] 208p. 58 refs. NASA N63-17257.

HW-76128 OTS $1.75

Hanford Atomic Products Operation, Richland, Wash.
PHYSICS RESEARCH QUARTERLY REPORT, OCTOBER-DECEMBER, 1962. Rept. on Contract AT(45-1)1350. 15 Jan 63, 64p. 5 refs. NASA N63-16419.

LA-2834 OTS $1.25

Los Alamos Scientific Lab., N. Mex.
APPROXIMATE MODELS FOR THERMALIZATION IN SOLIDS, by K. D. Lathrop. Rept. on Contract W7405-eng-36. Sep 62, 55p. 16 refs. NASA N63-15219.

LA-2886 OTS $1.00

Los Alamos Scientific Lab., N. Mex.
CESIUM WAVE FUNCTIONS, by Philip M. Stone. Rept. on Contract W7405-eng-36. Apr 63, 42p. 1 ref. NASA N63-16845.

LADC-5575 OTS $1.60

Los Alamos Scientific Lab., N. Mex.
SOME THEORETICAL ESTIMATES OF THE PHYSICAL PROPERTIES OF THE RARE EARTH METALS, by James T. Waber. Rept. on Contract W-7405-eng-36, [1962] 12p. 22 refs.

LA-2805 OTS $2.50

Los Alamos Scientific Lab., N. Mex.
THE TWO-BODY t-MATRIX FOR A FREE-BOUND SYSTEM. PART I. APPLICATION TO NUCLEAR CHARGE EXCHANGE, by James E. Young. Rept. on Contract W7405-eng-36. July 62, 123p. 40 refs. NASA N63-15918.

MITNE-25 OTS $1.50

Massachusetts Inst. of Tech., Cambridge.
MEASUREMENTS OF REACTOR PARAMETERS IN SUBCRITICAL AND CRITICAL ASSEMBLIES: A REVIEW, by Irving Kaplan. Rept. on Contract AT(30-1)2344. 15 Aug 62, 61p. 135 refs. NYO-10207.

MURA-661 OTS $1.25

Midwestern Universities Research Association, Madiston, Wis.
ON THE STABILITY LIMIT OF ORBITS IN A SPIRAL MAGNETIC FIELD, by W. N. Wong. Rept. on Contract AT(11-1)384. 12 Dec 62, 56p.

PB 163 057 OTS $5.60

NRC Committee on Hearing and Bio-Acoustics, Washington, D. C.
BIBLIOGRAPHY OF REPORTS ACQUIRED BY CHABA (AVAILABLE ON 30-DAY LOAN). Jan 63, 55p. 950 refs.

DESCRIPTORS: *Bibliographies, *Acoustics, *Hearing, *Noise, Audiometry, Psychoacoustics, Psychology.

Electronics

PB 163 397 OTS $13.00

Electron Tube Research Lab., U. of Minnesota, Minneapolis.
STUDY OF ELECTRICAL AND PHYSICAL CHARACTERISTICS OF SECONDARY EMITTING SURFACES, by W. G. Shepherd. Quarterly rept. no. 8 and Final rept. 1 Mar 53-31 Mar 55, on Contract DA 36-039-sc-42561. [1955] 189p. 40 refs. AD-68 764.

DESCRIPTORS: *Secondary emission, Surfaces, *Magnesium compounds, Oxides, *Thin films, *Single crystals, Color centers, Paramagnetic resonance, Absorption, *Photoconductivity, Heat treatment, Electron bombardment, Electrical properties, Physical properties

Information is given on the preparation of MgO thin films, their durability, and the surface reactions on them caused by electron bombardment. Studies on single crystals involved: the absolute determination of the excess Mg concentration in nonstoichiometric crystals, inhomogeneities in MgO crystals, the effect of X-ray induced color centers on secondary emission, the detection of paramagnetic resonance caused by color centers in MgO, the effect of heat treatment on the background optical absorption of MgO, the photoconductivity of MgO, the effects of temperature and departures from stoichiometry on the secondary emission of MgO, experiments on X-ray induced color centers in MgO, and the optical coloration which results from heating crystal samples at high temperatures in Mg or O vapor. Theoretical work was largely confined to the escape mechanism of secondaries (the excited electrons which have insufficient energy to raise electrons from the filled to the conduction band). The process was studied by which O is absorbed when a MgO crystal is heated in O_2. The formation of an optimum thin film of MgO on an Ag-Mg alloy by heat treatment in O involves a diffusion of O into and a diffusion of Mg out of the alloy; the conditions for minimizing the Mg diffusion are much less stringent if CO_2 is used as the oxidizing agent. An optical absorption coefficient of 5.7 mm^{-1} at a photon energy of 4.8 ev for an excess Mg crystal corresponds to about 4×10^{18} excess Mg atoms/cm^3. (DDC abstract)

UCRL-7253 OTS $0.50

Lawrence Radiation Lab., U. of California, Livermore.
AN INTERACTION BETWEEN A PLASMA AND A TRAVELING MAGNETIC DISTURBANCE, by Daryl D. Reagan. Rept. on Contract W7405-eng-48. 25 Feb 63, 11p. 11 refs. NASA N63-16565.

AD-405 730 repriced OTS $2.50

Physical Electronics Research Lab., U. of Minnesota, Minneapolis.
RESEARCH ON PHOTOEMISSION, ed. by W. T. Peria. Final rept., 16 Dec 61-15 Dec 62, on Contract AF 33(657)8041. Mar 63, 114p. 64 refs. ASD-TDR-63-340.

DESCRIPTORS: *Photoemission, *Sodium, *Germanium Work functions, *Semiconducting films, Crystal structure, Adsorption, Temperature, Secondary emission, Surfaces, Antimony alloys, Photoelectrons, Electrical conductance, Hall effect, *Sputtering.

Techniques used to obtain high vacua, to provide clean surfaces, to deposit Na on these surfaces and to measure their work functions are described. A method used to fabricate hemispherical grids is also included. Work function, electron diffraction and secondary emission studies of sodium-covered germanium are presented. Preparations for a field-emission study of the same system are described. In the study of the compound Na3Sb, preliminary data on the details of film formation have been obtained. and the inert atmosphere facility for the preparation of the bulk material has been completed. A brief description of the apparatus to be used in the study of anomalous photovoltaic effects in Ge films is given. (Author)
(See also AD-282 376)

Molecular Physics and Spectroscopy

TID-18033 OTS $2.60

Harvard U., Cambridge, Mass.
ELECTRIC RESONANCE MICROWAVE SPECTRUM, SPECTROSCOPIC CONSTANTS, AND ELECTRIC DIPOLE MOMENT OF Li^6F^{19}, by L. Wharton, W. Klemperer, and others. Rept. on Contract AT(30-1)2382. [1962] 25p. 24 refs.

TID-18034 OTS $1.60

Harvard U., Cambridge, Mass.
MICROWAVE SPECTRUM OF BaO, by L. Wharton and W. Klemperer. Rept. on Contract AT(30-1)2382. [1963]. 14p. 16 refs.

Optics

TID-17744 OTS $1.10

Illinois U., Urbana.
A LIQUID HELIUM COOLED TILTING STAGE FOR AN ELECTRON MICROSCOPE, by J. A. Venables. Rept. on Contract AT(11-1)1198. [1962] 8p. 3 refs.

PB 163 393 OTS $8.10

[Thompson] Ramo-Wooldridge, Inc., Los Angeles, Calif.
INFRARED SKY BACKGROUND INVESTIGATION, by T. R. Whitney, R. E. Eisele and others. Final rept. on Contract AF 33(600)30489, continuation of North American Aviation, Inc. Contract AF 33(600)24347. 30 Aug 57, 88p. 4 refs. Rept. no. RW 1631.87; AD-143 235.

DESCRIPTORS: *Sky, Infrared radiation, *Sky brightness, *Optical instruments, *Radiometers, Spectrum analyzers, Effectiveness, Design, Measurement.

A description is presented of 2 contrast meters which were fabricated in connection with the infrared sky background investigation (AD-54 347, AD-116 447). The principles of the contract meters, their relative merits, and their possible future practical use are specifically pointed out. Modifications of the radiometer are suggested to improve the value of narrow bandpass filtering. An explanation is given of the present method of applying corrections to the data to account for the bandpass of the automatic spectrum analyzer. The modifications which are suggested for the gradient meter would permit direct measurement of the autocorrelation function of the background and the crosscorrelation function of 2 spectral regions, and provide valuable data for use in instrument design. The data collected are applied to scanning design problems. (DDC abstract) (See also PB 156 468)

Solid State Physics

NAA-SR-Memo-7871 OTS $1.60

Atomics International, Canoga Park, Calif.
Al-Ni DIFFUSION REACTIONS, by O. O. Gamba. Rept. on Contract AT(11-1)GEN-8. 30 Oct 62, 11p. 2 refs.

TID-16560 OTS $1.60

Arizona State U., Tempe.
INHOMOGENEITIES IN SEMICONDUCTORS EXPOSED TO FAST NEUTRONS, by B. R. Gossick. Rept. on Contract AT(11-1)715. July 62, 15p. 12 refs.

AD-406 245 repriced OTS $1.50

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF THE RELATIONSHIP OF TWINNING TO BRITTLE FRACTURE OF REFRACTORY METALS, by C. N. Reid, A. Gilbert, and G. T. Hahn. Final rept., 1 Nov 61-31 Dec 62, on Metallic Materials, Contract AF 33(657)7376. Apr 63, 53p. 64 refs. ASD-TDR-63-360; NASA N63-16904.

DESCRIPTORS: *Twinning (Crystallography), *Heat resistant metals and alloys, *Molybdenum, Molybdenum alloys, *Carbon alloys, *Rhenium alloys, *Niobium, Fracture (Mechanics), Brittleness, Single crystals, Metallic crystals, Grain structures (Metallurgy), Creep.

The first year's work on this program is reported. It is concluded that there is good evidence for brittle fracture induced by mechanical twinning in single crystals and polycrystalline Mo-C with grain sizes larger than 0.40 mm. However there is no evidence for such failures in Mo-C of grain size smaller than 0.25 mm, or in high-purity Cb. The effect of recrystallization texture on twinning is demonstrated, and the orientation dependence of twinning in Cb crystals is reported; a most unusual plastic instability is described in crystals of one orientation. It is shown that twinning in Mo-35Re occurs in bursts, which form in less than 2 mu sec; nucleation of twins occurs only at small strains but lateral growth takes place up to at least 12% strain. (Author)

TID-15970 OTS $2.60

Little, Arthur D., Inc., Cambridge, Mass.
DIRECT OBSERVATION OF THE OXIDATION OF ALUMINUM SINGLE CRYSTAL SURFACES, by P. E. Doherty and R. S. Davis. Rept. on Contract AT(30-1)2756. May 62, 29p. 16 refs.

TID-17723 OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
INVESTIGATION OF SOLID SOLUTIONS IN THE ANTIFERRO-ELECTRIC REGION OF THE SYSTEM $PbHfO_3$-$PbTiO_3$-$PbSnO_3$-$PbNb_2O_6$, by R. H. Dungan, C. A. Hall, and A. H. Stark. Rept. on Contract AT(29-1)789. Jan 63, 16p. 4 refs. SCDC-2967.

Theoretical Physics

NASA N63-18015 OTS $0.75

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
NONADIABATIC THEORY OF ELECTRON-HYDROGEN SCATTERING, PART II, by A. Temkin and E. Sullivan. July 63, 23p. 14 refs. NASA TN D-1702.

NASA N63-17212 OTS $1.10

Stanford Research Inst., Menlo Park, Calif.
ON THE QUANTUM VIRIAL EXPANSION, by Felix T. Smith. Rept. on NASA Contract NASr-49(07). 1963, 6p. 6 refs. NASA CR-50132.

WIS-AEC-34 OTS $1.60

Theoretical Chemistry Inst., U. of Wisconsin, Madison.
GENERALIZED MOMENTUM OPERATORS IN QUANTUM MECHANICS, by Peter D. Robinson and Joseph O. Hirschfelder. Series 3. Rept. on Contract AT(11-1)298. 14p. 16 Apr 62, 14p. NASA N62-11992.

Thermodynamics

NYO-9458 OTS $3.60

Heat Transfer Lab., Mass. Inst. of Tech., Cambridge.
EXPERIMENTAL DETERMINATION OF CONTACT CONDUCTANCE FOR SOME STAINLESS STEEL CONTACTS, by Achilles Adamantiades. Rept. on Contract AT(30-1)2079. July 62, 32p. 2 refs.

TID-17734 OTS $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
TUNGSTEN-RHENIUM THERMOCOUPLES FOR DIFFICULT TEMPERATURE MEASUREMENTS OF ZIRCALOY-2 WELDMENTS, by W. A. Owczarski. Rept. on Contract W31-109-eng-52. 12 Nov 62, 10p.

NASA N63-17514 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ON THE EMPIRICAL CORRELATION OF CRITICAL BOILING HEAT FLUX FOR CHANNELS OF VARIOUS CROSS SECTIONS AND ORIENTATION, by Uwe H. von Glahn. June 63, 22p. 9 refs. NASA TN D-1656.

TID-17792 OTS $2.50

Nuclear Tech. Lab., Stanford U., Calif.
THE EFFECT OF TRANSVERSE TEMPERATURE GRADIENTS ON THE HEAT TRANSFER AND FRICTION FOR LAMINAR FLOW OF GASES, by Monty E. Davenport. Rept. on Contract AT(04-3)247. 31 July 62, 119p. 28 refs. Technical rept. 247-3; NASA N63-17259.

NUMEC-P-46 OTS $3.60

Nuclear Materials and Equipment Corp., Apollo, Pa.
HIGH-TEMPERATURE THERMAL CONDUCTIVITY OF URANIUM DIOXIDE, by Richard A. Wolf. Rept. on Contract AT(30-1)2389. 4 Sept 62, 37p. 23 refs.

AD-284 066 OTS $2.60

Rocket Power, Inc., Pasadena, Calif.
THE THERMODYNAMICS OF SEVERAL LIGHT METAL OXIDES, HALIDES AND OXYHALIDES, by J. A. Blauer, H. L. Peterson and others. Quarterly rept. no. 1, 9 May-9 Aug 62, on Contract DA 04-495-ORD-3530. [1962] 22p. 10 refs. ARPA Order no. 40-62; NASA N62-17214.

DESCRIPTORS: *Oxychlorides, *Boron compounds, *Aluminum compounds, Oxides, Halides, Metallic compounds, Thermodynamics, Evapotranspiration.

This report initiates the third year of a program to determine the thermodynamic properties of the high temperature stable species formed from reactions involving metals with oxygen and the halogens. The investigations on the species $(BOF)_3$(g), BOF(g), AlOF (g) and HBO_2(g) have been completed previously. The present report describes preliminary work on $(BOCl)_3$(g), BOCl(g) and AlOCl(g). Several transpiration experiments have yielded an approximate Third Law value of -406 kcal/mole for the ΔH_{f298} of the trimer $(BOCl)_3$(g). (Author)

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

Communication Theory

PB 163 320 OTS $4.60

Cowles Foundation for Research in Economics, Yale U., New Haven, Conn.
REMARKS ON THE ECONOMICS OF INFORMATION, by J. Marschak. Rept. on Contract Nonr-358(01). Apr 59, 42p. 14 refs. Cowles Foundation discussion paper no. 70; AD-225 459.

DESCRIPTORS: *Reports, *Communication theory, *Probability, Statistical processes, Economics.

Presented at the dedication of the Western Data Processing Center, University of California at Los Angeles, Jan 59.

NASA N63-17231 OTS $3.60

New York U. Coll. of Engineering, N. Y.
DETECTION OF SIGNALS IN COLORED NOISE, by Bernard Harris. Rept. on NASA Contract NAS5-408. 1 May 62, 39p. Tech. Memo. 25; NASA CR-50348.

PB 163 344 OTS $1.60

Syracuse U. Research Inst., N. Y.
STUDY OF JAMMING EFFECTS OF SINGLE SIDE BAND COMMUNICATIONS SYSTEMS, by Norman Balabanian and Eugene Kosso. Technical note no. 1 on Contract AF 30(602)1805. 1 July 58, 14p. 1 ref. SURI rept. no. EE526-587TN1; RADC-TN-58-239; AD-148 891.

DESCRIPTORS: Sidebands, Communication systems, *Radio communication systems, *Radio jamming, Effectiveness.

The purpose of this project is to conduct an engineering study in order to determine the effect of radio frequency jamming on the performance of single-side band communications systems, in particular, the AN/ARC-58 Radio Set. A survey of the literature has been made and several types of jamming have been chosen. A crew of listeners has been assembled and trained and equipment for conducting the experiments has been assembled. Preliminary tests have been performed but no quantitative data has yet been accumulated.

SOCIAL SCIENCES

NAS-NRC-1000-D
Order from NAS-NRC $2.00

Committee on Natural Resources, National Research Council, Washington, D. C.
ENERGY RESOURCES, by M. King Hubbert. Dec 62, 146p. 108 refs.

DESCRIPTORS: *Natural resources, *Energy, Power, Technological intelligence, *Fuels, Organic compounds, Coal, Oils, Natural gas, *Solar radiation, *Nuclear energy, *Economics, *Energy conversion, Energy management

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Nuclear energy
Outlook and recommendations

NAS-NRC-1000-E
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Committee on Natural Resources, National Research Council, Washington, D. C.
MARINE RESOURCES, by Sumner T. Pike and Athelstan Spilhaus. Dec 62, 10p.

DESCRIPTORS: *Natural resources, *Oceans, *Economics, Oceanology, Fishes, Minerals, Scientific research.

Discussion and recommended research.

NAS-NRC-1000-C
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Committee on Natural Resources, National Research Council, Washington, D. C.
MINERAL RESOURCES, by Dean F. Frasché. Dec 62, 34p.

DESCRIPTORS: *Natural resources, *Minerals, *Economics, Technological intelligence, Wastes (Industrial), Metals, Abundance, Consumption, Mining engineering

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The changing foreign picture
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The mining industry's dilemma
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NAS-NRC-1000
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Committee on Nautral Resources, National Research Council, Washington, D. C.
NATURAL RESOURCES, by Paul Weiss, Abel Wolman and others. Summary rept, 26 Nov 62, 46p. 1 ref.

DESCRIPTORS: *Natural resources, Forestry, Water, Mineals, Energy, Oceans, Recreation, Ecology, *Economics

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NAS-NRC-1000-A
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Committee on Natural Resources, National Research Council, Washington, D. C.
RENEWABLE RESOURCES, by Paul Weiss. Dec 62, 129p. 22 refs.

DESCRIPTORS: *Natural resources, *Economics, Conferences, Food, Production, Plants (Botany), Animals, Forestry, Marine biology, Soils, Processing, Political science, Education.

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Committee on Natural Resources, National Research Council, Washington, D. C.
SOCIAL AND ECONOMIC ASPECTS OF NATURAL RESOURCES, by Gilbert F. White. Dec 62, 57p. 4 refs.

DESCRIPTORS: *Natural resources, *Economics, *Sociology, Scientific research, Scientific organizations, Research program administration.

NAS-NRC-1000-B
Order from NAS-NRC $1.00

Committee on Natural Resources, National Research Council, Washington, D. C.
WATER RESOURCES, by Abel Wolman. Dec 62, 37p.

DESCRIPTORS: *Natural resources, *Water supplies, *Economics, Scientific research, Research program administration.

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NAS-NRC-1081
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Disaster Research Group, National Research Counicl, Washington, D. C.
THE SOCIAL AND PSYCHCLOGICAL CONSEQUENCES OF A NATURAL DISASTER: A LONGITUDINAL STUDY OF HURRICANE AUDREY, by F. L. Bates, C. W. Fogelman and others. 1963, 190p. 47 refs. Disaster Study no. 18.

DESCRIPTORS: *Disasters, *Sociology, *Hurricanes, *Stress (Psychology), *Stress (Physiology), Rescues, Survival, Damage, Therapy, Public health, Behavior, Attitudes, Group dynamics, Emotions, Social communication.

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Order from NAS-NRC $2.00

Disaster Research Group, National Research Council, Washington, D. C.
SOCIAL ORGANIZATION UNDER STRESS: A SOCIOLOGICAL REVIEW OF DISASTER STUDIES, by Allen H. Barton. 208p. 106 refs. Disaster Study no. 17.

DESCRIPTORS: *Sociology, *Stress (Physiology), *Stress (Phychology), *Disasters, Behavior, *Group dynamics, Therapy, Motivation, Therapy, Attitudes, Public opinion, Political science.

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Needed Research
Organization and Public Support

PB 163 394 OTS $3.60

Center for Documentation and Communication Research, Western Reserve U., Cleveland, Ohio.
COMPUTERS AND DOCUMENTATION, by Allen Kent. Technical note no. 5 on Contract AF 49(638)357. 15 Aug 58, 36p. 18 refs. AFOSR TN 58-766; AD-201 865.

DESCRIPTORS: *Computers, *Documentation, *Information retrieval, Programming (Computers), Metallurgy.

The magnitude of the documentation problem makes its solution one of extreme economic importance. Increasing awareness of the inadequacy of traditional library methods has led to the development during the past decade, of a number of nonconventional techniques for searching and correlating large files of recorded information. The several processes of human memory are postulated and models are described for simulating the more routine human operations involved in selecting desired information from large stores of documents. The analysis and encoding of metallurgical literature for searching with the Western Reserve University Searching Selector--a newly designed, special-purpose computer-are summarized. Examples of programming of searches with general-purpose computers are presented. (Author)

PB 181 541 OTS $0.75

Committee on Scientific Information, Federal Council for Science and Tech., Washington, D. C.
SCIENTIFIC AND TECHNICAL INFORMATION IN THE FEDERAL GOVERNMENT. Status rept. 18 June 63, 27p.

DESCRIPTORS: *Scientific information centers, *Scientific organizations, *Federal government, Reports, Subject indexing, Information retrieval.

Contents:
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Idaho Operations Office, Atomic Energy Commission, Idaho Falls.
MANUAL FOR OPERATIONAL DOCUMENTARY PHOTOGRAPHY, by V. V. Hendrix. 21 June 62, 19p. NASA N62-16998.

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National Research Council. Div. of Engineering and Industrial Research, Washington, D. C.
THE ROLE OF PATENTS IN RESEARCH. PART I. THE COMMITTEE REPORT. 1962, 45p. 24 refs.

DESCRIPTORS: *Conferences, Scientific research, *Patents, Engineering, Reports, Industrial research.

Contents:
Development of committee objectives
The engineering division academy-research council symposium
Committee observations on the symposium
Summary of symposium information directly related to committee objectives
Committee conclusions

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National Research Council, Div. of Engineering and Industrial Research, Washington, D. C.
THE ROLE OF PATENTS IN RESEARCH. PART II. PROCEEDINGS OF A SYMPOSIUM. 1962, 225p. 11 refs

DESCRIPTORS: *Conferences, Scientific research, *Patents, Engineering, Reports, Industrial research.

Contents:
Some legal considerations of patents and research
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Industrial research patent practice and publication policy
Experiences of the polaroid corporation regarding patents and research

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Office of Documentation, National Research Council, Washington, D. C.
SCIENTIFIC INFORMATION ACTIVITIES. 1962, 52p. 139 refs.

DESCRIPTORS: *Scientific organizations, *Reports, Anthropology, Psychology, Biology, Agriculture, Chemistry, Chemical engineering, Geology, Engineering, Industrial research, Mathematics, Medicine, Physics, Scientific information centers.

The purpose of this booklet is to survey the scientific information activities of the National Academy of Sciences--National Research Council. Science information has been broadly interpreted so as to include most information activities except those relating to original research publications. Details of all publications of the NAS-NRC are available in a catalog published annually by the Academy-Research Council.

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Office of Patent Policy Survey, National Research Council, Washington, D. C.
UNIVERSITY RESEARCH AND PATENT POLICIES, PRACTICES AND PROCEDURES, by Archie M. Palmer. Rept. on NIH Grants RG-7832 and RG-7832(C), and Contract Nonr-2300(22). Aug 62, 296p.

DESCRIPTORS: *Patents, *Universities, Reports, Processing, Scientific research.

The objectives of the present project were: (1) to make a comprehensive factual survey of the current research and patent policies and practices of institutions of higher learning in the United States, with particular reference to their procedures, administrative machinery and experience in the handling of research, both sponsored and unsponsored, and of new discoveries, inventions and patents thereon resulting from such research, (2) to critically analyze and summarize the data obtained and the observations made during the course of the survey and (3) to prepare an interpretive report on the findings.

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Transistors	S-16	PB 163 330
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U.S. DEPARTMENT OF COMMERCE FIELD OFFICES

SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field Offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

Among the many services which businessmen have found of value are:

GENERAL

- Management and business aids
- Establishing a new business

BASIC ECONOMIC DATA

- Census data with national and often State and regional breakdowns, on manufacturing wholesaling, retailing, service industries, employment and unemployment, population, housing, agriculture
- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

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